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SCHEME OF SOUND SYMBOLS

FOR THE PRONUNCIATION OF WORDS.

Note.—(-) is the mark dividing words respelt phonetically into syllables; (′), the accent indicating on which syllable or syllables the accent or stress of the voice is to be placed.

Sound-symbols employed in Respelling.	Representing the Sounds as exemplified in the Words.	Words respelt with Sound-symbols and Marks for Pronunciation.
ā	mate, fate, fail, aye	*māt, fāt, fāl, ā.*
ă	mat, fat	*măt, făt.*
â	far, calm, father	*fâr, kâm, fâ′thėr.*
ä	care, fair	*cär, fär.*
aw	fall, laud, law	*fawl, lawd, law.*
ē	mete, meat, feet, free	*mēt, mēt, fēt, frē.*
ĕ	met, bed	*mĕt, bĕd.*
ė	her, stir, heard, cur	*hėr, stėr, hėrd, kėr.*
ī	pine, ply, height	*pīn, plī, hīt.*
ĭ	pin, nymph, ability	*pĭn, nĭmf, ă-bĭl′ĭ-tĭ.*
ō	note, toll, soul	*nōt, tōl, sōl.*
ŏ	not, plot	*nŏt, plŏt.*
ô	move, smooth	*môv, smôth.*
ö	Goethe (similar to *e* in her)	*gö′tėh.*
ow	noun, bough, cow	*nown, bow, kow.*
oy	boy, boil	*boy, boyl.*
ū	pure, dew, few	*pūr, dū, fū.*
ŭ	bud, come, tough	*bŭd, kŭm, tŭf.*
û	full, push, good	*fûl, pûsh, gûd.*
ü	French plume, Scotch guid	*plüm, güd.*
ch	chair, match	*chär, măch.*
ċh	German buch, Heidelberg, Scotch loch (guttural)	*bôċh, hī′dėl-bĕrċh, lŏċh.*
g	game, go, gun	*gām, gō, gŭn.*
j	judge, gem, gin	*jŭj, jĕm, jĭn.*
k	king, cat, cot, cut	*kĭng, kăt, kŏt, kŭt.*
s	sit, scene, cell, city, cypress	*sĭt, sēn, sĕl, sĭt′ĭ, sī′prĕs.*
sh	shun, ambition	*shŭn, ăm-bĭsh′ŭn.*
th	thing, breath	*thĭng, brĕth.*
th	though, breathe	*thō, brēth.*
z	zeal, maze muse	*zēl, māz, mūz.*
zh	azure, vision	*ăzh′ėr, vĭzh′ŭn.*

HELIUM, n. *hē'lĭ-ŭm* [Gr. *hēlĭŏs*, the sun]: was first discovered in the solar prominences by Janssen, in 1868, and received its name from Lockyer and Frankland, who recognized that its spectrum must be due to an element unknown on the earth. In 1882 Palmieri observed the same spectral line from a volcanic mineral. The element was discovered by Sir William Ramsay, who obtained it from a rather rare mineral, termed Cleveite, in 1885. Cleve discovered it shortly afterwards, independently. Helium is found in small quantities in certain mineral springs and, accompanied by nitrogen, in a few rare minerals. Its symbol is He, it is the second lighted gas known and is the only one which has never been liquified. For this reason it is used to fill thermometers designed to measure very low temperatures.

Helium forms no compounds, but is closely related to RADIUM (q.v.), because it is formed as one of the products of decomposition of this latter element. Under ordinary conditions, the spectrum of helium shows a magnificent yellow line, with a few others, somewhat less bright, in the red, green, blue and violet regions of the spectrum. Helium exists in enormous quantities in the SOLAR PROMINENCES (q.v.). Its scarcity on the earth is due to its extreme lightness. The attraction of the earth is not sufficient to retain it in our atmosphere, so that it escapes to that of the sun. Helium is also found in enormous quantities in certain of the fixed stars.

HELIX, in Geometry: a curve traced by a point moving on the surface of a cylinder so that its progress along the cylinder is proportional to its motion around the cylinder. The equations of the helix are $x = a \cos O$, $y = a \sin O$, $z = co$.

HELL, n. *hĕl* [Icel. *hel*, death; *Hēlĭă*, the goddess of death: Dan. *helvede*, hell: AS. *helan;* Ger. *hehlen*, to hide —*lit.*, the hidden or unseen place, the hole beneath our feet (see HELE, or HELL)]: the place or state of punishment after death; the place of departed souls; any den of vice or misery; hades; the grave; a gambling-house. HEL'LISH, adj. *-ĭsh*, pertaining to hell; infernal. HEL'LISHLY, adv. *-lĭ*. HEL'LISHNESS, n. the qualities of hell; extreme wickedness or malignity. HELL-BROTH, any compound made for hellish purposes. HELL-HOUND, an agent of hell; a diabolical savage. GATES OF HELL, the power and influence of Satan and his demons. DESCENDED INTO HELL, into the place of the dead, properly *hades*.

HELL [Heb. *Sheol*, Gr. *Hades*, Sax. *Hell*, Ger. *Hölle* (see HEL: HELE, or HELL), originally a cavern or deep and dark abyss]: term used in various significations: often applied in the English translation of the Bible of 1611 (as Gen. xxxvii. 35; Job xiv. 13) to the grave, or to death, or as the equivalent of HADES (q.v.); but in strict usage denoting the place, or the condition after death, of the souls of those who, having failed during life to fulfil the essential obligations

imposed by the natural or the positive divine law, are consigned to a state of punishment. It should be noted that when the King James's translation was made, the word hell had not taken that definiteness of meaning as the place or state of the finally lost which it now bears in common usage. With the same unanimity which has existed as to a state of reward after death (see HEAVEN), almost all religions, ancient or modern, number among their most prominent doctrines the belief of a state of punishment after death—the nature of which is variously modified according to the peculiar tenets of each religion—for unexpiated guilt. Among early Christian writers, the word hell is variously employed, sometimes to signify a place of temporary purgation, in which sense it comprehends the Rom. Cath. Purgatory (q.v.); sometimes the place (*Limbus Patrum*) in which the souls of the just of the old law awaited the coming of Christ, who was to complete their felicity; sometimes the place in which unbaptized children are believed to be detained, on account of the stains of unremitted original sin; and lastly, the prison of those who die stained with the personal guilt of grievous sin. Many controversies out of place here, have arisen about the details of this doctrine, as to the place, the nature, and the duration of the punishment of hell. It will be enough to say that, though according to the literal sense of more than one passage of Scripture, and the popular notions of the various Christian communities, the place of hell would seem to be assigned to the interior abysses of the earth, or to the depths of the intermundane spaces, yet even the formularies of the Rom. Cath. Church, with all their rigorous precision of detail, and still more those of other communions, have abstained from any formal declaration as to the locality of the punishment of the damned. As to the nature of the punishment to which they are subjected, whether it is confined to the 'pain of loss'—that is, to the remorseful consciousness of having forfeited the presence of God, and the happiness of heaven—or whether and to what degree it further includes the 'pain of sense,' there is some difference between the Eastern and the Western churches, and it is sometimes alleged that the Eastern Church altogether rejects the idea of punishment of sense. This, however, is a mistake; both churches agree that the punishment of hell includes the 'pain of sense,' the controversy between them having regarded not the existence of the pain of sense, but certain questions as to its nature, and especially whether it consists in material fire, a point which, in the decree for the union of the Greek and Latin churches at the council of Florence, was left undecided. Scarcely any Protestants now hold to the theory of a material fire in the future world. The controversy on the subject of the eternity of the punishment of hell dates from an early period. Origen and his school having taught that the punishment of hell was but purgatorial in its object; that its purifying effect having once been attained, the punishment would cease for all, even for the devils themselves; and that its duration in each case is pro-

portioned to the guilt of the individual. This doctrine of the final restoration of all to the enjoyment of happiness, was the well-known Origenistic theory of the *apocatastasis*, to which so many of the early writers refer. It was rejected, however, by the common judgment of antiquity, and was formally condemned by the second council of Constantinople—a condemnation founded on the literal sense of many passages of the Scripture (see Matt. xviii. 8; xxv. 41, 46; Mark ix. 43; Luke iii. 7; II Thess. i. 9; Rev. xx. 10, etc.); and in the controversies between the Eastern and Western churches, on the subject of the punishments of hell, the belief of their eternity, in the strict sense of the word, was recognized as a common doctrine of both. In the New Testament, the name *Gehenna* is frequently used to designate the place of punishment of the damned (see Matt. v. 22, 29, 30; x. 28; xviii. 9; xxii. 13; Mark ix. 43; Luke xii. 5; James iii 6). The word Gehenna, indeed, unlike the Hebrew *Sheol* and the Greek *Hades*, is never found in any other signification than that of the place of punishment of the sinner after death: thus it denotes the idea which has come to be associated with the word hell in modern theology. See HADES.

HELLAS, *hĕl'las:* the original home of the Hellenes, or Greeks, according to the received opinion, was first a town; afterward, under the name Phthiotis, a well-known district of Thessaly. The ancients sometimes applied this name also to the whole of Thessaly. With the spread of the Hellenic people southward, the term embraced a gradually increasing territory, until it came to denote the whole of Middle Greece or Greece Proper (modern *Livadia*). At a still latter period, the Peloponnesus itself was included under the designation; and finally, Hellas came to be used in the broadest sense, as comprehending the whole of Greece, with its islands and colonies.—The HELLENES, or Greeks, as distinguished from the more ancient Pelasgians, received this name in the belief that they were descended from a certain Hellen. This mythical personage, son of Deucalion and Pyrrha, or, according to others, of Zeus and Dorippe, and father of Æolus, Dorus, and Xuthus, was said to have been king of Phthia, and to have ruled over all the country between the rivers Peneius and Asopus.

HELLEBORE, n. *hĕl'lĕ-bōr* [L. *hellĕbŏrŭs;* Gr. *hellĕbŏrŏs* —from Gr. *helein*, to kill or overcome; *bora*, food]: a common name of several poisonous plants, ord. *Ranunculăcĕæ;* the Christmas rose or flower: also the White Hellebore, ord. *Melanthaceæ*. HELLEB'ORINE, n. *-lĕb'ŏr-ĭn*, the active principle of hellebore. HELLEBORUS NIGER, *hĕl-lĕb'ŏr-ŭs nī'jĕr* [L. black hellebore]: the Christmas rose; a homeopathic medicine.

HELLEBORE, *hĕl'lĕ-bōr:* name applied to two very different genera of plants. The genus to which it properly belongs and to which it has belonged since very ancient times, *Hellebŏrus*, is of nat. ord. *Ranunculaceæ*, characterized by a calyx of 5 persistent sepals, often resembling petals; a corolla of 8 or 10 very short, tubular, honey-secreting

petals; numerous stamens and 3—10 pistils; a leathery capsule, and seeds arranged in two rows. The species are perennial herbaceous plants, mostly European, generally with a short root-stock; the stem mostly leafless, or nearly so but sometimes very leafy; the leaves more or less evergreen, lobed, the flowers terminal. A familiar example of this genus is the BLACK HELLEBORE—so called from the color of its roots—or CHRISTMAS ROSE (*H. niger*), a favorite in flower-gardens, because its large white flowers are produced in winter. The leaves are all radical; the stalks generally one-flowered; the flowers white or tinged with red. Black Hellebore formerly had higher reputation as a medicinal agent than it now has. Melampus is represented as employing it in the treatment of madness centuries before the Christian era. The root is the part used in medicine, and is exported from Hamburg, and sometimes from Marseille. It consists of two parts—the rhizome or root-stock, and the fibres arising from it. The former is nearly half an inch thick, several inches long, and knotty, with transverse ridges and slight longitudinal striæ; the latter are numerous, cylindrical, brown externally, and whitish internally. The taste is slight at first, then bitter and acrid. The chemical composition of the root is not accurately known. It is not much used at the present day, but has been found of service (1) in mania, melancholia, and epilepsy; (2) as an emmenagogue; (3) in dropsy—its action as a drastic purgative, and its stimulating effect on the vessels of the liver, rendering it useful; (4) in chronic skin diseases; (5) as an anthelmintic. Ten or fifteen grains of the powdered root act as a sharp purgative. The tincture, obtained by maceration in spirit, is usually given when its action as an emmenagogue is required. In an excessive dose, it acts as a narcotic acrid poison, and causes vomiting, purging, burning pain in the stomach and intestines, faintness, paralysis, and death. STINKING HELLEBORE (*H. fœtidus*) grows on hills and mountains in the s. and w. of Europe, and in parts of Britain; it has a very disagreeable smell, and green flowers somewhat tinged with purple: the stem is many-flowered and leafy. GREEN HELLEBORE (*A. viridis*), has a leafy stem, with a few large greenish-yellow flowers. The celebrated hellebore of the ancients was probably a species peculiar to Greece and the Levant, hellebore, *orientalis* or hellebore *officinalis;* all the species, however, have similar medicinal qualities. From the abundance of the plant around the city of Anticyra, hypochondriacal persons were said to need a visit to Anticyra. Closely allied to the genus *Helleborus* is *Eranthis*, in which the flowers are surrounded with an involucre, and have a deciduous calyx. A well-known species is the WINTER HELLEBORE, or WINTER ACONITE (*E. hyemalis*), a garden plant, whose yellow flowers, raised only a few inches above the ground, deck the flower-border about the same time with snowdrops. It is a native of middle Europe, but naturalized elsewhere. It thrives in shady places.

WHITE HELLEBORE (*Veratrum album*) belongs to the nat. ord. *Melanthaceæ*. The genus has polygamous flowers, with 6-leaved perianth, 6 stamens, 3 pistils cohering at the base, a 3-horned capsule separating into 3 many-seeded follicles, and compressed seeds winged at the apex. White hellebore has a leafy stem, sometimes 4 ft. high, ovate-oblong leaves, a long terminal compound panicle, and yellowish-white flowers. It abounds in the mountains of central and s. Europe. The root was formerly much used in medicine, but now rarely, though it seems to act powerfully in some diseases. It is a very acrid and active poison. Its powder is used to destroy lice, and by gardeners for killing caterpillars. A decoction and ointment of it are sometimes used in itch and ring-worm. Caution is necessary even in handling the powder of White Hellebore, and very unpleasant effects ensue from its getting into the eyes or nose. AMERICAN HELLEBORE, or SWAMP HELLEBORE (*V. viride*), known also as Indian Poke or Itch Weed, is frequent in damp grounds from Canada to the Carolinas. Its root has properties similar to those of White Hellebore. These properties seem to depend chiefly on an alkaloid called *Veratria*.

HEL'LEN: mythical ancestor of the Greeks. See HELLAS.

HELLENIC, a. *hĕl-lē'nĭk* [Gr. *Hellēnikŏs*, Grecian—from *Hellen*, mythical son of Deucalion]: pertaining to the Hellenes [*hĕl-lē'nĕs*], or Greeks. HEL'LENISM, n. *-lē-nĭzm*, a Greek idiom. HEL'LENIST, n. *-nist*, a Jew who spoke Greek; one skilled in Greek. HEL'LENIS'TIC, a. *-tĭk*, also HEL'LENIS'TICAL, a. *-ti-kăl*, pertaining to the Greek spoken by the Hellenists. HEL'LENIS'TICALLY, ad. *-lĭ*.—The name *Hellenists* was given to those among the Jews, and afterward in the Christian Church of Judea, who, either by birth or by residence, and by the adoption of the Greek language and usages, were regarded as Greeks in opposition to the Hebrews properly so called, whether of Palestine or of the Dispersion. The name has sometimes been improperly restricted to persons of Greek parentage or descent; but like other Gentile names of the same form, it marks a class distinguished by the peculiar habits and language of Greece rather than by Greek descent. The Hellenists, in this sense, formed a distinct body, and stood in a relation of ri alry, if not of antagonism to the Hebrews (see Acts vi. 1; ix. 29). There is also a clear distinction between Hellenes (Greeks—from Hellas, q.v.) and Hellenists. The latter might, it is true, be Hellenes by birth, but the prominent idea conveyed by the name was rather the adoption or affectation of Greek manners and language than Greek parentageor blood.

At the time of our Lord's crucifixion, the Jews of the Dispersion were in almost every part of the Roman empire; but it was among the Jews settled in Alexandria that the Hellenizing tendency found freest development; and to that city we must refer the formation of that peculiar dialect of the Greek language known as the Hellenistic, and of that singularly acute and speculative philosophy which

exercised so large an influence on the early Christian schools, and of which Origen is the most famous exponent.

The really characteristic element of the Hellenistic Greek consists in its foreign, especially its Hebrew and Aramaic words and idioms. Although it was in its origin a purely popular form of the language, yet through its use in the Alexandrian or Septuagint version of the Old Testament, it acquired all the fixedness and definite character of a written language. The Hellenisms of the Septuagint differ in many respects from those of the New Testament, which again present some points of discrepancy from those of the Alexandrian Fathers; but there are certain leading characteristics common to them all, which constitute the distinctive forms of the dialect, and which may be described as peculiarities of structure and forms of thought derived from those Hebrew or Aramaic idioms which were the native modes of speech of the Greek-speaking Hebrews.

For the influence of the Hellenistic modes of thought on the Alexandrian philosophy, see NEO-PLATONISTS; PLOTINUS; etc. PHILO (q.v.) was the greatest Jewish Hellenist. The Septuagint (q.v.) was the work of Hellenists. See Winer, *Grammatik des N. Test. Sprachidioms.*

HELLESPONT. See DARDANELLES.

HELL-GATE, or THE GATE (named by the Dutch settlers of New York, *Helle Gat*); narrow passage in the East River, about 7 m. from the Battery, and 1 m. e. of Central Park. At this point a ledge of gneiss projected beneath the channel for some distance from the Long Island shore, rose at certain places nearly to, and at others above the surface of the water, and formed a seething and eddying current extremely dangerous to navigation. The importance of the pass not only to the commercial interests of New York but the general transatlantic steam and sailing service, and the fact that almost the entire obstruction to a safe passage of the East River was found in the numerous reefs of rock at Hell-gate, induced the federal government to order a thorough survey as early as 1848. This was made by Charles H. Davis and David Porter, lieutenants commanding, U. S. N., who reported the existence and dangerous character of Pot and Frying-Pan rocks, very near mid-channel; Way's Reef, in the usual steamboat course; the Gridiron; Negro Head, the outer rock of the middle reef; Bread-and-Cheese rock, on the e. end of Blackwell's Island; Flood; Hen-and-Chickens; Great and Little Mill rocks; and the submarine projection at Hallet's Point. Lieut.com'd'g Davis urged the blasting of Pot-Rock, Frying-Pan, and Way's Reef, and Lieut.-com'd'g Porter favored the removal of at least a part of the reef at Hallet's Point. Nothing was attempted till 1851, when citizens of New York subscribed a fund to enable Maillefert, a French engineer, to apply his process of surface-blasting This resulted in blowing Bald-headed Billy and Hoyt's rocks into deep water, and the deepening of the water over Pot-Rock, Frying-Pan, Way's Reef, Shelldrake, and Diamond Reef; but no impression was

made on the Hallet's Point ledge. The following year congress made an appropriation for the removal of the rocks, and placed the work in charge of the engineer's dept. of the army. The Maillefert process was again used. and additional water gained over Pot-Rock. Various reports were made by city, state, and national committees, but no further practical steps were taken till 1866, when Brev.Maj.Gen. John Newton, U. S. engineers, was ordered to examine the passage and report a plan for its permanent improvement. He reported 1867, Jan., and considerable time was occupied in studying his plans, as they represented many new features of submarine blasting and differed in important essentials from the Maillefert process of surface-blasting by the explosion of cans of gunpowder ignited by a magnetic current—then the chief method known. Gen. Newton proposed constructing a submarine drilling scow to be moored over the scene of operations and provided with a dome holding 21 drill-tubes through which the drills were to work when the dome had been lowered over the point of attack; drilling holes 6 to 8 ft. apart and not less than 4 ft. deep; charging them with nitro glycerine; and after the explosion removing the broken rock by a steam-grapple. This plan was proposed for the minor rocks—that of Hallet's Point calling for operations of radically different character. The first use of this drilling scow and dome was upon Diamond-Reef near the mouth of the East River 1871, May. Holes were drilled 7 to 13 ft. deep, and charged with nitro-glycerine at the rate of from 30 to 55 pounds per hole. The same season the machine was used alternately on Coenties Reef, where 93 drill and 17 surface-blasts were made. In 1872 July, similar operations were begun on Frying-Pan rock, where 17 drill and 11 surface-blasts were made. The machine was then put over Pot-Rock, and between Aug. 5 and Dec. 28—when ice caused a cessation of work—40 holes were drilled and blasted, and 60 seam and 24 surface blasts made. In 1874, Aug., work on Way's Reef was begun, and by 1875, Jan. 20, it was wholly removed to a depth of 26 ft. at mean low water. This work comprised 262 holes drilled, over 16,000 pounds of nitro-glycerine and 38½ pounds of dynamite used, and 65 drill and 16 surface-blasts made. Since 1874, Coenties Reef, Shelldrake, Diamond Reef, a reef near the North Brothers, and the Heel-tap Rocks, n. of Great Mill Rock, have been blasted and entirely removed.

The great work on Hallet's Point Reef began 1869, Oct., and the excavations were finished—after various delays—1875, June, an actual working period of 4 years and 4 months. The reef extended 720 ft. along shore and about 300 ft. into the channel, and the area operated on contained about 3 acres. Work was prosecuted from a huge coffer-dam, from which 41 radial tunnels, long and short, were cut in the rock, with 11 transverse galleries, which left 172 piers of natural rock to support the roof. The tunneling was done first by hand-drilling and black

powder, and afterward by machine drills and quick explosives, and occupied the period 1870, July 5—1875, June. On the completion of the excavation or tunneling, 5,375 three-in. holes were drilled in the roof, and 1,080 three-in. and 286 two-in. holes in the piers; a total of 56,548 ft. of three-in. and 1,897 ft. of two-in. holes. The cubic contents of the roof and piers were 63,135 yards. Of the total number of holes 4,427 were charged with tin cases (the majority 22 in. and the remainder 11 in. long), containing in bulk 9,127$\frac{8}{16}$ pounds of rend-rock, 11,852$\frac{13}{16}$ pounds of Vulcan powder, and 28,935$\frac{4}{16}$ pounds dynamite No. 1. All the charged holes or mines were connected by wire, and divided into 23 divisions of 160 mines each, and the divisions sub-divided into groups of 20 mines each. The batteries numbered 23, one for each division, and each distinct from the other. When all was ready Gen. Newton's baby-daughter pressed an electrical button, 1876, Sep. 24; and a body of water, spray, and vapor immediately shot upward to a height of 123 ft.; a slight underground shock was felt in New York and Brooklyn; and the great explosion, whose effects had been dreaded by many timid persons, was over, and as far as known not a pane of glass was broken, even in buildings close to the shaft. When the broken rock was removed, it was found that there was a depth of 26 ft. at mean low water over the reef. Every cartridge had been exploded.

The largest and most dangerous obstruction in the whole locality was Flood Rock, sometimes called the Middle Reef, 1,200 ft. long and 600 ft. in its widest part. Gen. Newton began work on this rock 1875, June 7, and by 1876, May, had sunk two shafts, 23 and 51 ft. deep respectively, and excavated 229 ft. of tunnel. There were more frequent delays on this rock than at Hallet's Point; no work at all was done for more than a year, and fully two years' time was lost. In 1884, July, a govt. appropriation of $360,000 became available, and in the following month work was resumed. The same general course was pursued as at Hallet's Point. The area of reef operations was about 9 acres; of tunnelling 21,670 ft.; depth of gallery floors below mean low tide 50-64 ft.; supporting piers 467, each 15 ft. sq.; drill holes in roof 11,789 and piers 772; total length of holes 113,102 ft.; explosives used, 240,399 pounds of rack-a-rock, and 42,331 pounds of dynamite. The mines were fired by electricity 1885, Oct. 10, when the water rose to a height of 150 ft. and pieces of rock 40–50 ft. The entire roof of the reef was shattered, and the removal of the *débris* opened a channel about 1,200 ft. wide, nearly double the former one.

HELLIER, or HELER. See under HELE.

HELLISH. See under HELL.

HELM. See under HELMET.

HELM, n. *hĕlm* [Ger. *helm*, a handle, a rudder: AS. *helma*, a helm: Icel, *hialma*, a rudder: comp. Gael. *ailm*, a helm or handle of the rudder]: the movable instrument at the

hinder part of a ship by which it is steered: the place of direction or management. In nautical affairs the helm denotes the entire steering apparatus of a ship. This apparatus consists of three distinct portions—the rudder, the tiller, and the wheel; though in boats and small vessels the wheel is ordinarily dispensed with. The rudder is the instrument acting directly upon the water: for its action and form, see RUDDER. The tiller is a lever, formed into a handle, by means of which the steersman can greatly multiply on the rudder (whose position is almost identical with the fulcrum, the hinges) the power that he exerts against the end of the tiller. The wheel is an ordinary wheel and axle, moving the end of the tiller from side to side by the agency of ropes, again multiplying the power, and otherwise convenient as occupying a smaller space on the upper deck than the long tiller. To 'starboard the helm' is to put the tiller so as to carry the rudder to port; 'port the helm,' the reverse. To 'put up the helm,' is to let the ship go more fully from the wind; while to 'put down the helm,' is to exercise a contrary effect. HELM, v. to steer; in *OE.*, to guide or conduct. HELM'ING, imp. HELMED, pp. *hĕlmd:* ADJ. furnished with a helm. HELMS'-MAN, n. one who guides the helm.

HELMET, n. *hĕl'mĕt,* also HELM [Goth. *hilms;* Icel. *hialmr;* Ger. *helm,* a helmet—from Icel. *hilma,* to cover, to hide—*lit.*, the thing which conceals and protects]: defensive armor of metal or leather for the head. The earlier Greek and Roman helmets, shown by many extant sculptures, were surmounted by plumes, but unlike their modern successors, did not protect the face. During the middle ages, helmets were of the finest steel, often inlaid with gold, and provided with bars and flaps, to cover the face in action, and to allow of being opened at other times. As firearms became more common, helmets naturally lost their utility, especially as regarded the face. Those remaining are in military matters limited mostly to heavy cavalry, afford no protection to the face, and are for ornament rather than use. Firemen wear a heavy head-piece of leather and brass, to protect them from falling fragments. In India and other hot climates, helmets of white felt, with the additional screen of rolls of linen, are worn by men, as protection from the sun. In *her.*, the helmet denotes, by modifications in form, certain gradations of rank; and helmets were set over coats of arms to bear the crest, and indicate by their form the rank of the bearer. The part of the helmet which opens to show the face is called the *visor* or *beaver* (to allow of drinking—*beverage*). Four forms of helmet are now in use in English heraldry; for the king and princes of the blood-royal; for the nobility; for knights and baronets; for esquires. A much greater variety is in use in continental heraldry. A helmet is never placed over the arms of any woman except the sovereign. In *bot.*, an arched concave petal or sepal, or a part of one, as the upper lip of several labiate flowers. HEL'METED, a. furnished with a helmet.

HELMET-SHELL (*Cassis*): genus of gasteropodous mollusks of the family *Buccinidæ;* the animal much resembling the common Whelk (q.v.) with which it also nearly agrees in habits; the shell swollen, rather thick and solid, with bold ridges, a short spire and a long aperture, the outer lip toothed, the canal recurved. The species, which are numerous, are all natives of tropical seas. Most of them are beautiful; and they are used by engravers for making cameos, the differently colored layers producing exquisite effects when skilfully cut.

HELMHOLTZ, *hĕl'holts*, Hermann Ludwig Ferdinand von: 1821, Aug. 31—1894, Sep. 8: scientist: b. Potsdam, Prussia. He studied medicine at the military institute, Berlin, and served on the staff of one of the hospitals; afterward returning to Potsdam as an army surgeon. In 1848 he was given the chair of anatomy in the Berlin Academy; 1849 was called as professor of physiology to Königsberg; to a similiar place at Bonn 1855; to Heidelberg in 1858; and in 1871 to the chair of physics at the Berlin University. In 1887 he was appointed by the government director of the newly founded institution for physical research, where he remained till his death, though he continued to lecture occasionally at the University of Berlin. His exalted reputation was grounded on his work on *The Conservation of Energy* (1847). *Handbook of Physiological Optics* (1856–66) and *The Doctrine of Tone Sensations* (1862) are his most noted works. Professor Helmholtz is to be credited with notable discoveries in almost every department of physics. The most directly practical of these, and the one for which he is most generally known, was the ophthalmoscope, an instrument by which the whole interior of the eye can be readily examined, and which is now in universal use. He also invented a method of analyzing sound by the use of hollow bodies called resonators. He discovered the acoustic origin of the vowel sounds in human speech, and invented a series of tuning forks which enabled him to produce them artificially. He first established a relationship between sound and light by demonstrating the existence of 'sound colors' arranged in accordance with the laws of the solar spectrum. He succeeded in popularizing the branches of the sciences in which he labored, so that humanity in general might reap the fruit of his labors, alike in knowledge and in applied results. His published works are quite too numerous to be even named; and more than 120 of his scientific disquisitions have been read before the Royal Society alone. In 1873 he received the Copley medal from the Royal Society of London, Eng., and in 1883 was raised to 'the status of nobility' by decree of the Emperor William I. of Germany. In 1893 he visited the United States at a guest at the World's Fair, and was given receptions in Chicago and New York city. Helmholtz has more profoundly than any other man, save perhaps Darwin, modified the views of his generation with reference to some unsolved problems of the universe. The history of his life is that

of such scientific work as has never been surpassed, if equalled, by any individual. It has been said that the three ideas which will make the present century memorable in coming ages are the doctrine of the conservation of energy, the doctrine of evolution ,and the germ theory of disease. The first is indissolubly associated with the name of Helmholtz.

HELMINTHIC, a. *hĕl-mĭn'thĭk* [Gr. *helmins*, a worm]: relating to worms; expelling worms: N. a medicine for expelling worms. HELMINTHOID, a. *hĕl-mĭn'thoyd* [Gr. *eidos*, resemblance]: worm-shaped; vermiform. HEL'MINTHOL'OGY, n. *-thŏl'ŏ-jĭ* [Gr. *logos*, a discourse]: the science or history of worms: formerly of general application, but now restricted to the red-blooded worms, such as the medicinal leech and earth-worm. HEL'MINTHOL'OGIST, n. *-jĭst*, one who. HEL'MINTHOLOG'IC, a. *-thŏ-lŏj'ĭk*, or HEL'MINTHOLOG'ICAL, a. *-ĭ-kăl*, pertaining to worms or their history. HEL'MINTHITES, n. plu. *-thīts*, in *geol.*, applied to those long sinuous tracks so common on the surfaces of many flag-stones—usually considered as worm-trails.

HELMONT, *hĕl'mont*, JAN BAPTISTA VAN, Lord of Merode, Royenborch, Oorschot, and Pellines: Belgian chemist: 1577–1644; b. Brussels. After a course at the Univ. of Louvain, he accepted the chair of surgery there for two years. He became a devout mystic, and entered on a life of humility. The study of the works of Paracelsus seems to have turned his special attention to chemistry and natural philosophy, and in these studies he spent several years in the universities of Italy and France. He returned home, married and settled at his estate near Vilvorde, where he spent the remainder of his life in philosophic investigations, and where he died. Some writers regard him as the greatest chemist who preceded Lavoisier; but his language is often so obscure, that it is not always easy to ascertain his meaning. He was the first to point out the imperative necessity for employing the balance in chemistry. He is supposed by some authorities to have been the first to apply the term *gases* to elastic aeriform fluids. Of these gases he distinguished several kinds. He was also the first to take the melting point of ice and the boiling-point of water as standards for measurement of temperature. By means of the balance he showed, in many instances, the indestructibility of matter among chemical changes; e.g., he demonstrated that a salt dissolved in water, or silver dissolved in aquafortis, could be recovered unchanged in quantity. In his works first the term *saturation* is employed, to signify the combination of an acid with a base: and he was one of the earliest investigators of the chemistry of the fluids of the human body.

With other physiologists of his day, he speculated much on the seat of the soul, which he placed in the stomach, chiefly for these reasons. 1. It cannot exist in the brain, because that organ contains (according to Helmont) no blood; 2. It does exist in the stomach, because when we hear bad news, we lose our appetite. Helmont's chemical writ-

English essayist and historian. He entered at Trinity College, Cambridge, where he took the degree B.A. 1835, leaving the university, he obtained a post in the civil service, and on his resignation, he retired to Bishop's Waltham, in Hampshire, where, with ample possessions, he enjoyed lettered ease. His first notable work, *Essays Written in the Intervals of Business*, appeared in 1841. It was followed by two dramas, *Catherine Douglas*, and *King Henry the Second* (1843), by an essay on the *Claims of Labor* (1844), and by *Friends in Council* (1847–49). *Friends in Council* has been, and still is, greatly admired by thoughtful readers, and has gone through many editions. It is a series of readings and conversations on important social and moral questions, with peculiar beauty of style; luminous suggestions, brightness of humor, and sweetness of spirit. His *Conquerors of the New World and their Bondsmen* appeared 1848; *Companions of my Solitude*, 1851. Among his subsequent works are—*Oulita*, a play; *The Spanish Conquest in America* (1855–57, a work of careful research, but not as a whole successful); *Friends in Council*, 2d series (1859); *Essay on Organization; Life of Pizarro* (1869); *Casimir Maremna*, and *Brevia* (1870); *Life of Hernando Cortes; Thoughts upon Government* (1871); *Life and Labors of Thomas Brassey* (1872); and *Social Pressure* (1874) He was clerk to the privy council, and became a K.C.B. 1872.

Helps is the most delightful essayist since Lamb and Hunt. He everywhere shows acuteness, humor, a satire which gives no pain, and a quiet depth of moral feeling manifesting itself mainly in an earnest recognition of man's social responsibilities; while his style, in purity and clearness, can hardly be matched among his contemporaries.

HELSINGFORS, *hĕl'sĭng-fawrs:* fortified seaport of Russia, cap. of the govt. of Finland, and after Cronstadt, the most important naval station on the Baltic; beautifully situated on a peninsula, surrounded by islands and rocky cliffs, in the Gulf of Finland, 191 m. w. from St. Petersburg by sea (274 m. by rail). A series of formidable batteries, called the fortifications of Sveaborg, and consisting of seven strongly fortified islands and numerous islets, protect the entrance to the harbor, and are of such strength and so well appointed, as to warrant the application to them of the name of the Northern Gibraltar. The whole front presented by the successive works is about a mile in length, and, beside the casemates for small-arms, the united fortresses mount about 1,000 guns, and are garrisoned by 12,000 men. The harbor itself is further defended by two forts. Helsingfors is the largest and handsomest town of Finland; the broad streets, consisting of houses painted externally yellow and green, intersect at right angles, and there are several fine public squares. Of the public buildings, the most striking are the residence of the governor, the senate-house, the university buildings, and a magnificent church. The university, removed hither from Abo 1829, where it had been founded 1640, comprises four faculties,

and has from 2,000 to 2,500 students. In connection with it are a library of 190,000 vols., a hospital, a botanic garden, and a valuable observatory. Since 1840, Helsingfors has been a favorite bathing-place, and attracts many visitors during summer from St. Petersburg. The town has considerable trade in Baltic produce; it exports chiefly corn, fish, deals, and iron; and manufactures sailcloth and linen. It has the largest import trade in Finland. Pop. with garrison, 94,000.

Helsingfors was founded by Gustavus I. of Sweden in the 16th c., but the site of the town was removed nearer the shore 1639. In 1819, it became the cap. of Finland. In 1855, Aug., during the Crimean war, Sveaborg was bombarded for two days and nights by a section of the allied fleet, without any material impression being made upon the forts. The town has still many Swedish characteristics.

HELSINGÖR'. See ELSINORE.

HELST, *hĕlst*, BARTHOLOMEW VAN DER: Dutch painter: b. Haarlem in the beginning of the 17th c.; d. Amsterdam, 1670. He attained great celebrity as a portrait-painter. One of his works (in the Chamber of Justice at Amsterdam), representing 30 full-length figures of a train-band with the Spanish ambassador in the midst, was pronounced by Sir Joshua Reynolds 'the first picture of portraits in the world.' His *Militia Dinner* also is a splendid piece of art.

HELTER-SKELTER, ad. *hĕl'tĕr-skĕl'ter* [Low Ger *hulter-polter*, an exclamation imitating a loud rattling noise; *hulter-de-bulter*, in a great hurry]: in hurry and confusion; tumultuously.

HELVE, n. *hĕlv* [AS. *helf;* Bav. *helb;* O.Dut. *helve*, the handle of an ax: Ger. *helm*, handle of a tool]: the handle of an ax or hatchet: V. to furnish with a helve. HELV'ING, imp. HELVED, pp. *hĕlvd*.

HELVEL'LA: genus of fungi, of the order *Ascomycetes* (see FUNGI), closely allied to morels, but differing in having the *pileus* turned downward, lobed and folded, and the surface of the *hymenium* even. Some of the Helvellæ are edible, and much used in Germany.

HELVELLYN, *hĕl-vĕl'lĭn:* one of the highest mountains of England, in the lake district, Cumberland, between Keswick and Ambleside. It is 3,055 ft. high, is easy of ascent, and commands magnificent views.

HELVE'TIAN REPUBLIC. See SWITZERLAND.

HELVETIC, a. *hĕl-vĕt'ĭk* [L. *Helvetii*, anc. inhabitants of Switzerland]: pertaining to Switzerland. HELVETIC CONFESSIONS: see CREEDS AND CONFESSIONS.

HELVETII, *hĕl-vē'she-ī:* Celtic people inhabiting according to Cæsar, the region between the mountains of Jura on the w., the Rhone on the s., and the Rhine on the e. and n.—corresponding to modern Switzerland They had 12 towns and 400 villages. The great and fatal event in their history is their attempted irruption into and conquest of Southern Gaul, in which they were repulsed by Cæsar with

frightful slaughter. The story of this expedition is circumstantially narrated by the Roman commander. They collected three months' provisions, burned their 12 cities, 400 villages, and all isolated dwellings, and made a general rendezvous by Lake Leman in the spring B.C. 58. Cæsar hastened to Geneva, destroyed the bridge, raised two legions in Cisalpine Gaul, and when the Helvetians sent delegates to demand a passage, delayed them until he had built a wall along the Rhone, 16 ft. high and about 19 Roman miles in length, flanked with redoubts. Having vainly attempted to cross this barrier, the Helvetians took another route, but were followed and defeated with a terrible slaughter at Bibracte (modern Autun, in Burgundy), and the remnant compelled to return to their own country, where they became subject to the Romans. Of 368,000 who left their homes, including 92,000 fighting-men, only 110,000 returned. In the commotions which followed the death of Nero, the Helvetians met with another terrible catastrophe. Remaining faithful to Galba, they were fallen upon by Cacina, a general of Vitellius, who gave them to the rapacity of his legions. They were massacred by thousands, multitudes were sold to slavery, and their towns pillaged and burned, their capital destroyed, and their governor executed. From this time they scarcely appear as a distinct people.

HELVETIUS, *hĕl-vē′shĭ-ŭs*, CLAUDE-ADRIEN: 1715–1771, Dec. 26; b. Paris; from a family of Swiss origin, as the name Helvetius implies He received a careful education. Intended for a financial career, he was sent to his uncle, D'Armancourt, *Directeur des Fermes*, at Caen, to obtain a practical knowledge of the subject, and at the age of 23 was appointed to the lucrative office of *Fermier-Général;* but the oppressive nature of the duties which it involved was not at all to the liking of Helvetius, who was of very humane and easy disposition, and he quickly resigned it for the situation of chamberlain to the queen's household. He now led, like every other courtier of his time, a life of mere gallantry, which appears odious as judged by modern standards; but happily he soon tired of it, and after marrying 1751 the beautiful and accomplished daughter of Comte de Ligneville, he withdrew to a small estate at Voré, where he spent the most of his life in the education of his family, the improvement of his peasantry, and literary labors. In 1758 appeared his celebrated work, *De l'Esprit*, in which he endeavors to prove feeling (*sensibilité*) to be the source of all intellectual activity, and that the grand lever of all human conduct is self-satisfaction. But he admits, at the same time, that self-satisfaction assumes different forms; e.g., the self-satisfaction of a good man consists in the subordination of private to more general interests—first, to the circle among which he lives; then to the community; and, finally, to the world at large. The philosophy of the book is, of course, materialistic; it denies man's liberty of choice between good and evil, and denies the existence of an absolute right. It was denounced

by the doctors of the Sorbonne, and condemned by the parliament of Paris to be publicly burned. It is not evident that the book had force sufficient to call forth such antagonism. Helvetius was much disgusted, and 1764 left France to visit England, and Germany, where Frederick II. received him with distinction. He died at Paris, leaving a work, *De l'Homme, de ses Facultés, et de son Education*, published by Prince Galyzin (2 vols. London, 1772). Among the editions of his collected works, were two published at Paris 1795, one in 5 and the other in 13 vols. His wife, who survived him many years, resided at Auteuil, near Paris, where she was visited by the most distinguished personages, and is often mentioned in the memoirs of that brilliant period.

HEL'VOETSLUYS. See HELLEVOETSLUIS.

HEM, n. *hĕm* [W. *hem*, a hem, a border: Gael. *aom*, to bend over: Fris. *heam*, a hem]: the edge or border of a garment doubled down and sewed: V. to fold down and sew the edge of cloth. HEM'MING, imp. HEMMED, pp. *hĕmd*.—SYN. of 'hem, v.': to border; edge; inclose; environ; confine; shut: see HEM 2.

HEM, v. *hĕm* [an imitative word: Ger. *hemmen*, to stop the motion of a body: Sw. *hamma*, to restrain,to check: Ger. *hamm*, or *humm*, an int. of prohibition, stop! let it alone!]: to confine; to inclose; to surround. HEM'MING, imp. HEMMED, pp. *hĕmd*, inclosed; surrounded. *Note.*—The general sense of 'to confine, to surround,' seems to run through both entries of HEM.

HEM, n. or int. *hĕm* [imitative]: a half-voluntary cough as a preparation for speaking, or as a call to a person at a little distance.

HEMA- [Gr. *haima*, blood]: used in the beginning of many compound words—(Hemac-, Hemad-, Hemal-, Hemas-, Hemat-) for which, see the same words beginning with HÆMA-.

HEMANS *hĕm'anz*, FELICIA DOROTHEA: 1793, Sep. 25—1835, May 16; b. Liverpool: English poetess. Her father George Browne, was of Irish extraction, and her mother of mixed German and Italian descent. At an early age she showed a taste for poetry, in which she was encouraged by her mother. Her first volume was published 1808 when she was only 15 years of age, and contained a few pieces written about four years earlier; her second, *The Domestic Affections*, appeared 1812. In the same year she married Captain Hemans of the 4th Regt., whose health had suffered in the retreat on Corunna, and afterward in the Walcheren expedition, and who found it necessary a few years after to remove to Italy. After that period they never met. Although five sons were born of this marriage, it was not understood to have been happy. Mrs. Hemans, spent the rest of her life in N. Wales, Lancashire, and latterly at Dublin, where she died. Her principal works are—*The Vespers of Palermo*, a tragedy (1823); *The Siege of Valencia, The Last Constantine, and other Poems* (1823); *The Forest*

Sanctuary (1827); *The Songs of the Affections* (1830); and *Hymns for Childhood, National Lyrics and Songs for Music*, and *Scenes and Hymns of Life*. A volume of *Poetical Remains* was published after death; subsequently a complete edition of her works, with a memoir by her sister, was issued by Messrs. Blackwood.

Mrs. Hemans, without great daring or force, is sweet, natural and pleasing, with fine imagination and an attractive enthusiasm and romance. She had skill in versification, and a delicate perception of rhythm. But she was too fluent, especially too emotionally fluent, and wrote much and hastily; her lyrics are her best productions; her more ambitious poems, especially her tragedies, being insipid. Still, she was a woman of true genius, and one or two of her little pieces, *The Graves of a Household*, *Treasures of the Deep*, *The Homes of England*, and some others, are perfect in pathos and sentiment, and will live as long as the English language.

HEMATIN, n. *hĕm'ă-tĭn* [Gr. *haima*, blood]: a product resulting from the decomposition of *hemoglobin*, or the coloring matter of blood: see HAEMATIN, a. *ĭk*, pertaining to or resembling hematite.

HEMATOLOGY: the study of the blood, more particularly as applied to the diagnosis and treatment of disease. Although the fact that an intimate relation exists between the state of the blood and the general health has long been recognized and it has been known that many diseases are accompanied by profound changes in this fluid, the science of hematology in its present form is of comparatively recent date. Through the perfection of means for the investigation of microscopic objects, and aided by the developments in the realm of bacteriology the possibilities of study have been greatly amplified and hitherto undreamt of principles and physiological laws have been discovered. It is now known that not only are alternations in the character of the blood a highly important feature in numerous affections of greater or less severity, but also that in a majority of all diseases the blood exhibits changes which may be recognized by appropriate methods of investigation and which are often of great service in making the diagnosis and forming an opinion in regard to the course of the malady.

The blood is really a tissue of the body just as much so as muscle or bone, but through its fluid nature is enabled to serve as a vehicle for carrying food and oxygen to all the tissues and for transporting waste products from the seat of their production to the organs designated for their elimination. Human blood comprises about one-thirteenth of the body weight, is slightly alkaline in reaction, has a specific gravity of about 1060 and is composed of a fluid portion or plasma which holds in suspension an equal bulk of microscopic particles, the corpuscles or blood cells. This plasma is a yellowish fluid of extremely complicated composition containing albuminous bodies fats, carbohydrates. salts and about 90 per cent of water. The corpus-

cles are of three main types, the red cells, the white cells, and the blood plates; a fourth variety of still more minute bodies called blood dust being also recognized though their nature is still uncertain. The red cells of normal blood are all of one type and are chiefly concerned in transporting oxygen and carbonic acid, while of the white cells or leucocytes, at least four sorts may be distinguished and their functions are numerous and complicated. The red cells number about 5,000,000 to the cubic millimeter (an amount equal to a very small drop) the leucocytes about 5,000 to 10,000, and the blood plates about 500,000. The varieties of leucocytes are as follows: Lymphocytes, cells a little larger or a little smaller than a red cell and having a single round or oval nucleus; and polymorphonuclear leucocytes, cells a little larger than a red cell and having a nucleus which is contorted or broken into several parts. According to the color taken up by these polymorphonuclear cells when treated with certain staining fluids they are divided into neutrophiles which stain a reddish-purple, eosinophiles which stain bright red, and basophiles which stain deep blue. The blood plates are much smaller than the red cells and are concerned in the clotting of the blood. In health the proportions of these cells to each other are about as follows; lymphocytes, 22 to 25 per cent, neutrophiles, 65 to 75 per cent, eosinophiles 2 to 4 per cent, basophiles, 5 per cent, but in disease these ratios are often disturbed in a characteristic manner.

The evidences of disease manifested by the blood may involve changes in the number, appearance or composition of the red cells, in the number and relative proportions of the different white cells or the presence of abnormal forms of these, the presence of bacteria or animal parasites, peculiarities in the behavior of the blood serum when brought in contact with cultures of bacteria, abnormalities in the time required for clotting of the blood to take place, and changes in the temperature at which the blood freezes.

The apparently difficult task of counting the red or white cells is really very easily accomplished. The tip of the finger or the lobe of the ear is pricked with a lancet and a small portion of the drop of blood that appears is drawn by suction into a small glass pipette so constructed that one part of the blood may be diluted to any desired degree (usually 1-100) with a diluting fluid of a composition such as not to injure the corpuscles. A droplet of this diluted mixture is placed in a tiny glass cell the bottom of which is ruled with lines so close together as to form squares that are visible only under the microscope. By counting the number of corpuscles seen under the microscope in a single square a simple computation gives the number of cells in a unit quantity of undiluted blood.

The amount of hemoglobin or oxygen carrying substances present in the red corpuscles may be determined by several different methods most of which depend on the fact that the quantity of hemoglobin corresponds closely to the depth of color of the blood. A drop of blood is

diluted to a definite degree and the color of the fluid obtained is compared with a standard color scale of glass, colored fluid, or printed on paper, from which the percentage of hemoglobin may be directly read off.

In order to study the characteristics of the blood cells by means of the microscope two methods are in common use One is to place a minute drop of blood on a glass slide, cover it with another very thin slip of glass and examine it without further preparation. The other and more generally useful plan is to spread a drop of blood out over the surface of the glass slip in a very thin film, allow it to dry and then apply one of a large number of staining fluids that have been devised for this purpose. It is in the different forms of anemia that the red blood cells and the hemoglobin percentage exhibit the greatest abnormalties. See ANEMIA; CHLOROSIS; LEUKEMIA. The enumeration of the leucocytes is of service in the diagnosis of inflammatory diseases, for in nearly all the infectious diseases there is an increase in the number of white cells. This may be only slight, i.e. from 12,000 to 13,000 or may sometimes, as in pneumonia for example, reach 50,000 or 60,000 or even higher. Typhoid fever is unusual in that it is accompanied by a fall instead of a rise in the number of leucocytes. Scarlet fever, meningitis, erysipelas, acute articular rheumatism, and septicemia, or blood poisoning, are attended by an increased number of leucocytes. Counting the leucocytes is of especial value in surgical cases in which the presence of a concealed abscess is suspected, for the formation of pus is always accompanied by a rise in the number of leucocytes. In appendicitis, for example, the decision in regard to operation is greatly aided by ascertaining whether or not the leucocytes are abnormally high in number. In this connection the determination of the ralative proportions of the different varieties of leucocytes is also of assistance, for when pus is present the percentage of neutrophilex cells is increased at the expense of the other varieties. In some conditions, notably asthma, certain skin diseases, trichinosis, and the presence of tape worms the eosinophiles become more numerous. In lymphatic and myelogenous leukemia (q.v.) the leucocytes become disproportionately abundant and abnormal forms appear.

A very important field of blood examination is concerned with what is called the serum diagnosis of infectious diseases. In certain bacterial diseases, such as typhoid fever for example, a drop of the patient's blood serum mixed with a drop of bouillon in which typhoid bacilli are growing will cause the latter to cease their ordinarily active motion and become massed together in groups. Serum from a healthy person or from an individual suffering from some other disease does not have this effect so that this Widal reaction as it is called, is of great service in the diagnosis of doubtful cases of fever.

In malaria, relapsing fever, the African sleeping sickness, filariasis, and certain other rare tropical diseases the parasites causing the malady live in the circulating blood and

may be detected by the microscope in stained preparations. The malarial organisms are particularly easy to find and are present in every case of true malaria. Bacteria of many sorts may also grow in the blood and in obscure fever important information may be gained by drawing a little blood from a vein with a hypodermic syringe and inoculating bacteriological culture media with it.

Human blood usually clots in from three to five minutes but in some conditions such as jaundice and haemophilia (q.v.) this time is much lengthened. It is therefore sometimes of importance to test the coagulation time before an operation is performed. The determination of the freezing point of the blood is a rather complicated procedure that is sometimes resorted to in order to ascertain whether the organs of elimination, particularly the kidneys, are functionating properly. In health the blood freezes at a definite temperature (—0.55° to –0.57° C.—about one degree Fahrenheit below the freezing point of water) but if there is retention of waste products this point is lowered sufficiently to be recognizable by means of suitable instruments.

For the recognition of exceedingly small amounts of blood which is sometimes necessary in medical and also in medico-legal work several different forms of tests are available. Of the chemical methods the Teichmann hemin reaction may be mentioned. This is carried out by adding a minute amount of sodium chloride and acetic acid to a fragment of the suspected material on a glass microscopic slide and heating over a flame. If blood is present characteristic crystals of hemin are formed which are too minute to be seen with the naked eye. Other tests are the aloin and the benzidin tests in which a blue color appears if the fluid to which the reagent is added contains blood. The spectroscope may also be used, as the spectra of hemoglobin and its derivatives are characteristic. To differentiate human blood from that of the lower animals the corpuscles may be measured if they are sufficiently well preserved to permit of this, but the so-called biological test is more satisfactory. To perform it a solution of the suspected material is added to the blood serum of a rabbit that has received several intraperitoneal injections of human blood, If the suspected material contains human blood a white precipitate forms when the mixture has stood in a warm place for some time; the blood of the lower animals does not give the reaction. See also Blood; Haemoglobin; Bacteriology; Immunity; Serum Therapy: Malaria.

HEMERALOPIA, n. *hĕm′ĕr-ă-lō′pĭ-ă* [Gr. *hēmĕra*, day; the latter part of this is formed of *alaos*, blind, and *ops*, eye; the *l* may be introduced for the sake of euphony]: night vision only; day-blindness; intermittent amaurosis, in which the person is able to see only in the twilight. Sometimes this word is used with exactly the opposite meaning, viz., night-blindness; this is, however, Hemeralops, n. *hĕm′ĕr-ă-lŏps*, one afflicted with day-blindness.

HEMEROBAPTISTS, *hē-mer-o-băp'tĭsts:* ancient Jewish sect allied doctrinally with the Pharisees, but agreeing with the Sadducees in the denial of a belief in the resurrection of the dead. They were so called because of their custom of making daily ablutions as a sign of the spiritual cleansing from sin, and are mentioned by Epiphadius—who called their belief the fourth heresy among the Jews—by Hegesippus, and Justin Martyr. By some the name has been given also to the Mendæans, or Christians of St. John.

HEMEROCAL'LIS. See DAY-LILY.

HEMI, *hĕm'ĭ* [Gr. *hēmĭ*, half—from *hēmĭsŭ*, the half]: a prefix signifying a half. DEM'I [F.]: a half. SEM'I [L.]: a half.

HEMICARP, n. *hĕm'ĭ-kârp* [Gr. *hēmĭ*, half; *karpos*, fruit]: in *bot.*, one portion of a fruit which spontaneously divides into halves.

HEMICHOREA, n. *hĕmtĭ-kōr'ĕ-a* [prefix *hemi-;* Gr. *choreia*, dancing]: in *pathol.*, form of chorea, or St. Vitus's dance, in which the movements are entirely confined to one side.

HEMICRANIA, *hĕm-ĭ-krā'nĭ-a,* or HEMICRANY [Gr. *hemi*, half; *kranion*, the skull; Fr. *migraine;* Eng. *megrims*]: a variety of headache (q.v.), affecting only one side at a time, also frequently intermittent; whence it has been termed, not accurately, brow-ague.

HEMICYCLE, n. *hĕm'ĭ-sī-kl* [Gr. *hēmĭ*, half; Eng. *cycle*]: a half cycle or circle; in *bot.*, applied to the transition from one floral whorl to another when it coincides with a definite number of turns of the spiral.

HEMIDESMUS, *hĕm-ĭ-dĕs'mŭs:* genus of plants of nat. ord. *Asclepiadaceæ.* The root of *H. Indicus* is used in medicine, chiefly in India, and is known as Indian sarsaparilla. It appears to derive its properties from a crystallizable and volatile principle called *Hemidesmin* or *Hemidesmic* Acid. The plant is a climbing shrub, with leathery leaves and axillary umbels of flowers. It is common in almost all parts of India.

HEMIDIAPENTE, n. *hem-ĭ-dī-a-pĕn'tē:* in *mus.*, an imperfect fifth.

HEMIDISTROPHIA, n. *hĕm-ĭ-dĭs-trō'fĭ-a* [prefix *hemi-;* Gr. *dus.* hard; *trophē*, nourishment]: in *bot.*, only partial nourishment, as in the case of trees nailed to a wall or whose roots are prevented from spreading sufficiently by too close proximity to other roots.

HEMIDITONE, n. *hĕm-ĭ-dĭt'ōn:* in *mus.*, the less or minor third.

HEMIGAMOUS, a. *hĕ-mĭg'ă-mŭs* [Gr. *hēmĭ*, half; *gamos*, marriage]: having two florets in the same spikelet, one of which is neuter and the other unisexual.

HEMIGLYPH, n. *hĕm'ĭ-glĭf* [Gr. *hēmi*, half; *gluphē*, a carving]: in *arch.*, a half channel at the edge of the triglyph tablet in the Doric entablature.

HEMIHEDRAL, a. *hĕm'ĭ-hē'drăl* [Gr. *hēmĭ*, half; *hedra*, a seat]: in a *crystal*, having only alternate faces developed; having only half the usual number of normal planes.

HEMILYTRA, n. plu. *hĕm'ĭ-lī'tră* [Gr. *hēmĭ*, half; *elŭtron*, a sheath]: among certain insects, wings which have the apex membranous, while the inner portion is chitinous, and resembles the elytron of a beetle.

HEMIMETABOLIC, a. *hĕm'ĭ-mĕt-ă-bŏl'ĭk* [Gr. *hēmĭ*, half; *metabŏlē*, change]: applied to insects which undergo an incomplete metamorphosis.

HEMIMORPHITE, n. *hĕm'ĭ-mŏr'fīt* [Gr. *hēmĭ*, half; *morphē*, shape]: a silicate of zinc forming a valuable ore.

HEMIOPIA, n. *hĕm'ĭ-ō'pĭ-ă* [Gr. *hēmĭ*, half; *ops*, the eye]: disease of the eye in which only half the object is seen: the disease is rare, and imperfectly understood.

HEMIPLEGIA, *hĕm-ĭ-plē'jĭ-a* [Gr. *hemi*, half; *plēgē*, stroke]: paralysis (q.v.) limited to one side of the face and body usually depending on disease of the brain. It is opposed in signification to Paraplegia (q.v.).

HEMIPODE, *hĕm'ĭ-pōd* (*Hemipodius*): genus of gallinaceous birds, nearly allied to quails, but distinguished by a more slender beak, and by the want of a hind-toe. They are the smallest of gallinaceous birds, and inhabit cultivated ground and sterile sandy plains in warm countries. One species, the ANDALUSIAN HEMIPODE (*H. tachydromus*), is found in Spain, Italy, Sicily, Africa, and Australia. The whole length is about six inches.

HEMIPTERA, n. plu. *hĕ-mĭp'tĕr-ă*, or HEMIP'TERS, n. plu. *-tĕrz* [Gr. *hēmĭ*, half; *pteron*, a wing]: order of insects with four wings, a mouth formed for sucking, undergoing imperfect metamorphoses, and having the first pair of wings either of a firm membranous substance without scales, or leathery at their base, and membranous at their tips. Those with the first pair of wings of the former character are the order *Homoptera* (q.v.) of many entomologists; the latter are the *Hemiptera proper*, the section or suborder *Heteroptera* of Cuvier and others. The wings of the hemiptera proper in general overlap each other, and are horizontal or slightly inclined when at rest. Some kinds are wingless, which, however, otherwise exhibit the characters of this order. Some of the hemiptera feed on vegetables, and some on animal juices. The principal changes which they undergo in their metamorphoses are increase of size and development of wings. They are active in all stages. Some of them are aquatic. They are most abundant in tropical countries, and some of the tropical kinds are very splendid. Examples of this order are water-bugs, boat-flies, and water-scorpions. HEMIP'TERAL, a. pertaining to; also HEMIP'TEROUS, a. *-ŭs*.

HEMISPHERE, n. *hĕm'ĭ-sfēr* [Gr. *hēmĭ*, half; *sphaira*, a globe]: a half sphere or globe; sphere bisected by a plane passing through its centre; a representation of half the earth; in *anat.*, applied to each lateral half of the brain.

HEM'ISPHER'ICAL, a. *-sfĕr'ĭ-kăl*, or HEM'ISPHER'IC, a. *-ĭk*, containing half a sphere or globe; half-round.

HEMISTICH, n. *hĕm'ĭ-stĭk* [Gr. *hēmĭ*, half; *stichos*, a row, a verse]: the half of a line in poetry, or an incomplete line. HEMISTICHAL, a. *hĕm-ĭs'tĭ-kăl*, pertaining to a hemistich.

HEMITROPE, a. *hĕm'ĭ-trōp* [Gr. *hēmĭ*, half; *trŏpē*, a turning]: half turned: N. in *min.*, a twin crystal whose halves exhibit a reversed position to one another. HEMITROPAL, a. *hĕ-mĭt'rō-păl*, in *bot.*, designating an anatropal ovule in which the raphe only extends along the back of the ovule—only half-way from the chalaza to the micropyle. See ANATROPAL.

HEMLOCK, n. *hĕm'lŏk* [AS. *hemleac;* comp. Ger. *hammen*, to maim, and AS. *leac*, a leek, a plant—*lit.*, the herb that hurts], (*Conium*): genus of plants of nat. ord. *Umbelliferæ*, having compound umbels of small white flowers, small general and partial involucres, the limb of the calyx merely rudimentary, and a compressed ovate fruit with four prominent wavy ridges and no *vittæ*. The best known and only important species is the COMMON HEMLOCK (*C. maculatum*), which grows by waysides, on heaps of rubbish, and similar situations in Britain and on the continent of Europe in temperate Asia and now also as a naturalized plant in cultivated districts of N. America and in Chili. It has a root somewhat resembling a small parsnip; a round branched, hollow, bright-green stem, 2–7 ft. high, generally spotted dark with purple; the leaves large, tripinnate, of dark shining green color; the leaflets lanceolate, pinnatifid. All parts of the plant are perfectly destitute of hairs, and the stem is smooth and spotted with purple. Both the general and partial umbels have many rays. The general involucres consist of several small leaflets; the partial involucres of three small leaflets, all on one side. The whole plant has a nauseous smell, particularly if rubbed or bruised. The leaves, and sometimes the fruits, are employed in medicine. They should be gathered just before the time or at the commencement of flowering, and after the removal of the larger stalks they should be quickly dried by a heat not exceeding 120°. They should then be preserved in perfectly closed tin canisters. As, however, the dried leaves sometimes yield no *conia*, *conylai*, or *coniine* (a volatile alkaloid, which is the active principle in the plant), the fresh leaves are much more certain in their action.

The most important ingredient in hemlock is the coniine (q.v.) which is more abundant in the fruit (seeds) than in the leaves. From 40 lbs. of the ripe but green seeds, Dr. Christison obtained two ounces and a half of hydrated conia. As it is volatile, it is obtained by distilling the seeds with water which contains a little potash in solution: conia then passes over with the water in the form of a yellowish oil, and when purified by redistillation, it is obtained as a colorless, transparent, oily liquid, having a specific gravity of 0.8, a penetrating, hemlock-like odor, communicating a

burning sensation when applied to the tongue, and acting as a very energetic poison. It exhibits a powerful alkaline reaction, and precipitates many metallic oxides from their salts. Strong sulphuric acid causes its compound to assume first a purple-red, then an olive-green color; while nitric acid gives a blood-red color, fading into an orange. Its composition is represented by the formula $C_8H_{15}N$. Wertheim has recently discovered a second alkaloid in hemlock, which contains the elements of two equivalents more of water than conia. The substance, whose formula is $C_8H_{17}NO$, he names *conidrin*. It may be sublimed in beautiful colorless needles, and is much less poisonous than conia.

Conia has been introduced into the *Pharmacopœia Norvegica* under the name of *Coniinum*, the dose being from one-fortieth to the one-sixtieth part of a grain. The following illustration will give an idea of its activity as a poison: One drop placed in the eye of a rabbit killed it in nine minutes; three drops employed in the same way killed a strong cat in a minute and a half; while five drops poured into the throat of a small dog began to act in thirty seconds, and in thirty seconds more, motion and respiration had ceased. It seems to exhaust the energy of the spinal cord, and thus to cause muscular paralysis.

The uses of hemlock in medicine may be arranged under two distinct heads: (1) Those which depend on its resolvent and alterative powers; (2) Those which have reference to its influence over the nervous system. (1) It has been found useful in mammary tumors and profuse secretion of milk, in bronchocele, in enlargements of the liver, spleen, and pancreas, in scrofulous affections, etc., and at one time had high reputation in cancer. (2) It is useful as an antispasmodic and anodyne in hooping-cough, spasmodic cough, generally asthma, neuralgia, etc.

In large or poisonous doses it sometimes gives rise to coma (such as opium does), and sometimes to convulsions or violent delirium. Kercher relates the following singular instance of delirium from its use: Two priests ate hemlock-root by mistake; they became raving mad, and fancying that they were geese, plunged into the water. For three years they were afflicted with partial palsy and violent pain.

It may be administered internally in the form of powder (of the leaves), tincture or extract, while externally it may be applied as a soothing application to ulcers, painful piles, etc. in the form of ointment or poultice. The conia being volatile, often escapes from the powdered leaves and from the extract, and of the three preparations named, the tincture is the best. The *succus conii*, or *Preserved Juice of Hemlock*, prepared by pharmaceutical chemists, is more certain in its action than any of the pharmacopœial preparations.

In cases of poisoning by hemlock, the evacuation of the stomach is the first thing to be attended to. Among the ancient Greeks, poisoning by hemlock was a common mode of death for condemned criminals, and thus it was that Socrates died; but whether the juice of the Common Hem-

lock or the Water Hemlock was used is unknown. WATER HEMLOCK, or COWBANE (*Cicūta virosa*), also is an umbelliferous plant, of a genus having much vaulted umbels, a 5-toothed calyx, and almost globose fruit, each carpel with five broad flattened ribs and evident single *vittæ*. Water hemlock grows in ditches, the margins of ponds, and wet grounds in Europe and n. Asia. It has a large, fleshy white root, covered externally with fibres, an erect, much-branched stem 2–5 ft. high; tripinnate leaves, with linear-lanceolate regular and sharply serrated leaflets, no general involucre or only a single small leaflet, partial involucres of many short, narrow leaflets and white flowers. It is a virulent, narcotic, acrid poison. Serious accidents have occurred from eating the root. Another species *C. maculata*, is common in N. America, growing in marshy places. It has a spotted stem, like that of a true hemlock, the name of which it very generally receives in N. America. The leaves are triternate, the leaflets ternate. It is a very poisonous plant, and has been the cause of deaths. *Cicuta* in Latin, seems to have been the name of the same plant called *Conicion* by the Greeks, but it is not known whether this or the previous plant was so denominated.

HEM'LOCK SPRUCE. See FIR.

HEM'METER, JOHN COHN, American physician: b. Baltimore, Md., 1864, April 25. He studied at the Royal Gymnasium, Wiesbaden, Germany; Baltimore City College; and University of Maryland; and became clinical professor of medicine in the last named institution, and director of the clinical laboratory. He is associate editor of *Archives for Digestives Diseases*, Berlin, and author of: *The Special Pathology and Treatment of Diseases of the Digestive Organs* (1896); *Diseases of the Stomach* (1897); *Diseases of the Intestines* (1901); *Theodore Billroth, a biography* (1900). He is also a composer, and has composed *Hygeia* (cantata); *Prelude and Choral Music to the 23d Psalm* and other works.

HEMODORACEÆ —HEMOGLOBINE —HEMOPTYSIS. See under HÆ-.

HEMORRHAGE—HEMORRHOIDS. See under HÆ-.

HEMP, n. *hĕmp* [Dut. *hennip*; Ger. *hanf*; Icel. *hanpr*]: the fibres or threads of a plant of the same name cleaned and dressed, used for making coarse cloth, ropes, etc.; the *Cannăbis sătīvă*, ord. *Cannăbīnăceæ;* another species *C. indica*, used in India under various names as a narcotic and intoxicant. HEMPEN, a. *hĕm'pn*, made of hemp. HEMPY, a. *hĕm'pĭ*, like hemp; fibrous. HEMPY, or HEMPIE, n. *hĕm'pĭ*, in Scot., one for whom the hemp grows; a rogue. Adj. roguishly; romping. HEMP-SEED, the seeds of hemp-plants, used as food for cage-birds, and from which an oil is expressed.

HEMP (*Cannabis Sativa*): plant of the nettle family, cultivated for the fibres which surround the stem and for its seed. The fibre is similar to that of flax but is stronger and is not as soft or fine. The seed contains about 25

per cent. of an oil valuable for painting. From the juice of the plant, also from the seed, the people of warm countries obtain an intoxicating liquor. The narcotic poison hashish is obtained from the seed and a preparation from the Indian hemp (*C. indicas*), is often used in medicine but in unskilled hands is a dangerous remedy; this species is worthless for fibre production. In the United States the seed is fed, in small quantities, to live stock. Cooking renders it more digestive.

Hemp (*Cannabis sativa*).
A, male inflorescence; B, female inflorescence.

When the seed is allowed to ripen, hemp is a somewhat exhausting crop, and should not be grown upon a given field more than once in five years. When cultivated for the fibre alone and rotted on the land, it is not exhausting. It is a native of a warm temperate region, northern India, and reaches its fullest development in such climates, often attaining a height of 16 or 18 ft. It is not cultivated in the tropics. In this country, on rich land, it grows from 7 to 12 ft. high. It is produced, to some extent, in nearly all civilized countries, but more largely in Russia than elsewhere. The United States imports large quantities of the fibre every year.

Hemp thrives best in a rich and moist soil. The land should be ploughed in the autumn and again in the spring. Manures or fertilizers should be freely used and thoroughly worked into the ground for the previous crop. The surface must be made very fine just before the seed is sown, At the north, sowing is done from about the middle of April to the middle of June. About midway between these dates is best in ordinary seasons. At the south, earlier sowing is required. The seed is sown broadcast at the

rate of about 1 bushel per acre, either by hand or by drill with the teeth replaced by a board to spread the seed. The seed may be covered with a light harrow. Grain drills usually cover hemp seed too deeply. As the seed loses its vitality with age it is desirable to sow that of the previous year's growth. If older seed is used the quantity should be increased. The principal enemies of the hemp plant are the cut-worm (see CUT-WORM) and broom rape, parasitic on hemp roots. As the plant is vigorous and grows rapidly, it will keep down weeds and will not require cultivation.

When the blossoms turn yellow and begin to fall, usually in from 13 to 15 weeks after the seed is sown, the hemp should be harvested. Until recently this was done by cutting the plants by hand but the present practice is to cut them with a self rake reaper, mowing machine or self binder. After drying for two or three days the stalks should be bound and put into stacks, which may remain until cool weather. It should then be rotted in order that the fibre may be separated from the woody stalk which it envelops and to which it tenaciously adheres. Rotting is accomplished by spreading the stalks thinly and evenly upon a grass-covered field, called dew-rotting; or by submerging them in a pond or tank, known as water rotting. For the former method from three to six weeks are required and the stalks need to be turned once or twice. Water-rotting requires less time and gives better results. It is frequently commenced in two or three days after the plants are cut, and completed in two or three weeks. The warmer the water, the more rapidly the rotting is effected. When the woody stem will break without bending and will separate readily from the fibre, the process is finished. If spread upon the grass, the stalks should be bound and stacked. If rotted in water, they must be spread and dried before they are tied in bundles. The hemp is sometimes sold from the stack to manufacturers, who separate the fibre from the waste matter by machinery. In other cases the separation is effected in the field by means of a rude brake which reduces the stems to short pieces which are shaken out by whipping the fibre over the brake. The fibres are sometimes combed and straightened by being drawn through a hatchel made of long, sharp iron teeth set in a plank, but some manufacturers prefer to do this work in their own shops with machines designed for the purpose. When these processes are completed, the fibre is packed in bales and sent to market.

When hemp is grown for seed, a different method of cultivation should be pursued. It should be planted in hills not less than three and a half ft. apart each way, with 10 or 12 seeds in each hill, to provide for possible failure to germinate. Cultivate both ways several times during the season. Thin slightly when the plants are small. When they are 10 or 12 inches high, remove all but three stalks in a hill and bring the earth well around them with a hand hoe. It is a peculiarity of hemp that the staminate and pistillate blossoms grow on different plants, When the blos-

soms appear, most of the former are removed, only enough being left to fertilize the seed stalks: one male plant in every other hill is sufficient. Some growers remove a much larger proportion. When the pollen has all fallen, the remainder of the male plants are cut out. The other plants should be allowed to stand until the seed is matured. They should then be cut, and placed in shocks to remain until thoroughly cured. If allowed to become over-ripe, the seed will shell badly in the field. As it is liable to heat, the hemp should be very dry when threshed and the seed spread thinly in a cool and well ventilated room. On good land 12 to 15 bushels per acre may be obtained.

HEMPL, George, American philologist: b. Whitewater, Wis., 1859, July 6. He was graduated at the universities of Michigan 1879 and of Jena in 1889, and was appointed instructor in German at Johns Hopkins University in 1884. After spending three years abroad (1886–9) in study at Göttingen, Tûbingen, Strasburg, and Berlin, he became junior professor of English in the University of Michigan, where he has been professor of English philology and general linguistics since 1897. He has been a voluminous writer, and among his technical works may be mentioned *German Orthography and Phonology* (1897); *German Grammar* (1901).

HEMP PALM (*Chamærops excelsa*), [see Chamærops]: a palm of China and Japan, the fibre of the leaves of which is much used in those countries for making cordage. Hats are made of its leaves, and even cloaks and other garments for wet weather.

HEMPSTEAD: a former village in Queens co., Long Island, N. Y.; on the Long Island railroad, 20 m. e. of Brooklyn. It is tastefully laid out, prettily built, lighted with gas and electricity, and contains Hempstead Institute, several churches (the Presb. organized 1644; and the Prot. Episc., possessing a charter granted by George II. and communion plate given by Queen Anne), several public halls, patent-leather factory, machine shops, newspapers, flour and molding-mills, fire dept., and hotels. Hempstead township borders on the Atlantic Ocean, and contains 19 villages of which Rockaway, Pearsall's, Baldwin's, Freeport, Garden City (q.v.), and Rockville Centre are the principal. The upper half of the original township, bordering on Long Island Sound and known as N. Hempstead township, also contains many villages, and its village Mineola, was formerly a capital of Queens co., and the seat of the noted Queens co. agricultural fairs. Hempstead and its neighboring villages are popular resorts of New York families and fashionable life has established itself in hotels along the ocean beach and on the island of Long Beach, which is near. Hempstead became a part of Greater New York, 1898, Jan. 1.

HEMPSTEAD-BEDS, n. *hĕmp'stĕd* [from *Hempstead* parish near Yarmouth, in the Isle of Wight]: series of geological beds, some marine, others freshwater, of Lower Miocene age, and of 170 ft. in thickness.

HEMS, *hĕms*, or HOMS, *hōms*, or HUMS, *hūms* [Lat. *Emesa*]: city of Syria, about a mile e. of the right bank of the Orontes, lat. about 34° 44′ n., long. 36° 43′ e. It is 65 m. n.e. of Baalbek and 110 m. w.n.w. of Tadmor (Palmyra). It is clean, compactly built, and surrounded by old walls; and though no ancient buildings remain, the antiquity of the city is attested by numerous fragments of columns, by several Greek inscriptions, and the foundations of ancient baths with specimens of mosaic pavement. In ancient times it was noted for its splendid temple of the Sun, one of the priests of which Elagabalus or Heliogabalus, was raised to the imperial throne of Rome. Under the walls of Hems, Zenobia was defeated by Emperor Aurelian 272. In 636, the city was taken by the Saracens, when its old Semitic name Hems was revived; and 1099 the Crusaders rode through its opened gates. Since then, Hems has experienced many vicissitudes of fortune, all of which, however, it has survived, and is now the seat of a flourishing trade, and of several manufactures. Pop. 20,000 to 30,000 of which about 7,000 are Christians.

HEMSTERHUIS, *hĕm′stĕr-hoys*, TIBERIUS: 1685, Jan. 9—1766, Apr. 7; b. Groningen, Holland: he became prof. of Greek and of history at Leyden 1740, where he died. One of the greatest Greek scholars of his time, Hemsterhuis may be said to have created a new school of Greek philology, to which belonged his distinguished pupils Ruhnken and Valkenaer. His editions of the *Onomasticon* of Pollux (1706), of the *Select Dialogues* of Lucian (1708 and 32), and of the *Plutus* of Aristophanes (1744, by Schäfer 1811), are his principal literary works. A beautiful picture of his life is given in Ruhnken's *Elogium Hemsterhusii* (Leyd. 1768 and 89), republished in Lindemann's *Vitæ duumvirorum T. Hemsterhusii et D. Ruhnkenii* (Leip. 1822). From Hemsterhuis's MSS., *Anecdota Hemsterhusiana* (1825) have been edited by Geel, and *Orationes et Epistolæ* (1839) by Friedemann.

HEMSTITCH, n. *hĕm′stĭch:* a stitch in needlework, made by drawing out a few parallel threads and fastening the cross threads in successive small clusters.

HEM′STREET, CHARLES, American journalist and author: b. New York, 1866, Sept. 20. He entered the profession of journalism as a reporter in 1886, and was connected with the City Press Association until 1900, when he resigned to devote himself to literature and historical research. He has published: *Manhattan* (1888); *Nooks and Corners of Old New York* (1899); *The Calendar of Old New York* (1900); *History of New York City* (1901); *When Old New York was Young* (1901); *Literary New York* (1903); *Flower of the Fort* (1904); etc.

HEN, n. *hĕn* [Icel. *hæna*, a hen—from *hani*, a cock; *hann*, he, *hun*, she: Ger. *henne*, a hen]: the female of any kind of fowl (see FOWL). HEN′PECKED, a. *-pĕkt*, governed by the wife. HEN-COOP, *-kôp*, a cage for fowls. HEN′HARRIER, a kind of hawk or kite—so called as the harasser or enemy

of hens. HEN'BANE, n. *-bān* [*hen*, and *bane*], (*Hyoscy'amus*); genus of plants of nat. ord. *Solanaceæ*, having a five-toothed calyx, an irregular funnel-shaped corolla, and a capsule opening by a lid, and inclosed in the hardened calyx. The species are mostly annual and biennial herbaceous plants, and natives of countries near the Mediterranean Sea. COMMON HENBANE (*H. niger*) represents some 15 species of the Mediterranean region, and springs up in waste places throughout Great Britain and the eastern United States where it has become naturalized. It is an annual, somewhat bushy, about two ft. high; with large sinuated or sharply lobed leaves without leaf-stalks, and large dingy-yellow flowers, with brownish-red or purple veins. The whole plant is covered with unctuous hairs, and has a nauseous smell, which gives warning of its strong narcotic poisonous quality.

The seeds contain in largest quantity the peculiar alkaloid on which chiefly the properties of the plant depend *Hyoscyamia* or *Hyoscyamine*, which crystallizes in stellated acicular crystals of a silky lustre. The symptoms of poisoning by henbane are similar to those produced by other narcotic poisons, and the proper treatment is the same as in poisoning by opium. In medicine, henbane is employed both externally and internally. The leaves are the part commonly used: they are gathered and quickly dried when the plant is in full flower. Fomentations of henbane are applied to painful glandular swellings, parts affected with neuralgia, etc., and are often found to afford relief. An extract of henbane is sometimes employed instead of belladonna to dilate the pupil of the eye. Tincture and extract of henbane are often administered in annoying cough, spasmodic asthma, and other diseases requiring sedatives and antispasmodics. Henbane is used also to calm mental irritation and to induce sleep. For many cases, it has one great advantage over laudanum, in not producing constipation. The smoke from the burning seeds of henbane is sometimes introduced into a carious tooth, to relieve toothache. The other species of henbane possess similar properties. The dried stalks of *H. albus* are used by smoking in Greece to allay toothache.

HENCE, ad. *hĕns* [AS. *heona;* OE. *hennes*, hence]: from this place; from this source; from this time; away; to a distance; for or from this reason. HENCE'FORTH, ad. *-fōrth*, from this time forward. HENCEFOR'WARD, ad. *-fŏr'word*, from this time to futurity. *Note.*—FROM HENCE is a common but erroneous expression; the 'from' is superfluous.

HENCHMAN, n. *hĕnsh'măn* [*haunch*, and *man:* OE. *henxman*, a groom]: a supporter; one who stands at one's haunch; a servant. *Note.*—It is said that OE. *hengest*, a horse, and *man* is a more probable derivation, thus meaning 'groom,' or one who attends to his master's horse or horses.

HEND, v. *hĕnd*, or HENT, v. *hĕnt* [Icel. *henda*, to seize: OF. *hancher*, to grasp or snatch at with the teeth]: in *OE.*,

to seize; to lay hold on; to surround; to mob; to overtake. HEND'ING, imp. HEND'ED, pp. HENT'ING, imp. HENT'ED, pp.

HENDECAGON, n. *hĕn-dĕk'ă-gŏn* [Gr. *hĕndĕka*, eleven, *gōnĭă*, an angle]: a figure of eleven sides and eleven angles.

HENDECASYLLABLE, n. *hĕn'dĕk-ă-sĭl'ă-bl* [Gr. *hĕndĕkă*, eleven; *sullăbē*, a syllable]: a metrical line of eleven syllables.

HENDERSON, *hĕn'dĕr-son:* city, cap. of Henderson co., Ky.; on the O. river, and the Louisville and N., the Illinois C., and the Louisville, Henderson and St. Louis railroads; 74 m. n. of Hopkinsville, 212 m. w.s.w. of Louisville. It is in a rich timber, coal, and salt region; has regular steamboat connection with Louisville, Memphis, and other points; ships large quantities of tobacco and grain, and contains tobacco stemmeries, cigar factory, foundry, car-works, carriage and wagon factories, grist, saw, and planing mills, woolen and churn factories, municipal water-works, gas and electric-lighting plants, banks, churches, schools, fair grounds and park. The government, under the charter of 1893, invested in a mayor, elected for four years, and a common council. Pop. (1910) 11,452.

HENDERSON, N. C., town, county-seat of Vance county, on the Southern and the Seaboard A. L. R.R.'s; about 12 m. east of Oxford and 42 m. north of Raleigh. Henderson was settled in 1820, but was not incorporated until 1842. It is situated in a cotton and tobacco region of the state. The chief industrial establishments are cotton-gins, cotton-seed oil mills, cotton-mills, knitting-mills, tobacco warehouses, wagon-factories, flour-mills, and lumber-yards. Its chief trade is in cotton and tobacco. Pop. 4,000.

HENDERSON, Texas, town, county-seat of Rusk county; on a branch of the International & G. N. railroad; about 122 m. southeast of Dallas and 165 m. north by east from Houston. It is situated in an agricultural section, and the chief industries are connected with agricultural products. Its chief industrial establishments are a foundry, a pottery, and cotton-gins. The trade is in manufactured articles, live-stock, cotton and vegetables. It is the seat of a normal college.

HEN'DERSON, ALEXANDER: 1583–1646, Aug. 19; b. Creich, Fifeshire, Scotland: ecclesiastic and reformer. He was educated in the Univ. of St. Andrews, became prof. of rhetoric and philosophy there 1610, was presented to the living of Leuchars by Abp. Gladstanes 1612, and after a brief period of extreme unpopularity occasioned by his Episcopal views he adopted Presbyterianism, and labored with large results in that parish 18 years. When, 1636, Charles I. attempted to force Episcopal forms on the Church of Scotland, prescribing for it a book of ecclesiastical canons, one of ordination, and a third of common prayer, Henderson took the lead in opposing the measure. The bishops ordered the ministers to use the new forms, the

ministers united in a petition drawn up by Henderson to the privy council for a suspension of the orders, and a large majority of the Scotch people favoring the opposition, committees of 4 members each were appointed to represent the noblemen, gentlemen, burgesses, and ministers. These representatives, known as 'The Tables,' met in the parliament house; their meetings were at once prohibited by the king, and the delegates determining to renew the national covenant, Henderson wrote the bond and Warriston the legal warrant. The covenant was subscribed by several thousand persons in the Greyfriars Church, Edinburgh, 1638, Feb. 28. Copies of the document were distributed and eagerly signed in all parts of Scotland. While Henderson was supporting the popular measure in the n. shires, the king was forced by the widespread dissatisfaction to call a meeting of the gen. assembly and parliament. The former met in the Glasgow Cathedral 1638, Nov. 21, and Henderson was unanimously chosen moderator; whereupon it was dissolved by the king's orders. But the body continued sitting, condemned the assemblies 1606–18 and the Service Book, excommunicated 8 bishops, deposed the other 6, and prohibited the Episcopacy and the articles of Perth. Henderson was transferred from Leuchars to Greyfriar's Church, Edinburgh, 1639, Jan. 10, published the Remonstrance of the Nobility and Instructions for Defensive Arms, was one of the Scotch commissioners at the 'pacification' of Birks—when the king granted all the demands of the Scotch—and 1640 was elected rector of Edinburgh Univ., an office to which he was re-elected annually till his death. He drew up the 'Solemn League and Covenant.'

HEN'DERSON, Charles Hanford, American educator and author: b. Philadelphia, 1861, Dec. 30. He was graduated from the University of Pennsylvania in 1882, was lecturer at the Franklin Institute 1883–5, 1885–6; lecturer on education at Harvard 1897–8; and director of Pratt Institute, Brooklyn, 1898–9. He has published *Elements of Physics* (1900); *John Percyfield: the Anatomy of Cheerfulness* (1903); *The Children of Good Fortune* (1905); etc.

HENDERSON, Charles Richmond, American educator: b. Covington, Ind., 1848, Dec. 17. He was graduated from the University of Chicago in 1870, and has been professor of sociology there since 1892. He was president 26th National Conference of Charities 1898–9, and vice-president National Prison Association. He has published *Social Spirit in America* (1896); *Social Settlement* (1897); *Social Element* (1898); and has edited numerous publications.

HENDERSON, David Bremner, American statesman: b. Old Deer, Scotland, 1840, Mar. 14; d. Dubuque, Iowa, 1906, Jan. 25. He was educated in the public schools and Upper Iowa University; in 1861 entered the army as lieutenant of the Twelfth Iowa regiment; lost a leg at Corinth (1863), and was discharged from the service.

He then became commissioner of the board of enrolment in the 3d Iowa district, but re-entered the army as colonel in 1864. He studied law and was admitted to the bar in Iowa in 1865, and was United States district attorney in the northern division of Iowa 1869–71. He early became prominent in the local politics of his district, and was a delegate to three republican national conventions. In 1882 he was elected to the house of representatives, and was re-elected biennally till 1902. He was for many years one of the leaders of the republicans in the house, served on the committee of appropriations for 10 years, and was chairman of the judiciary committee and a member of the committee on rules in the 54th and 55th Congresses. He assisted Speaker Reed (q.v.) in the making of the 'Reed rules,' was consistently an advocate of sound money, and a strong supporter of President McKinley's Cuban policy. At the organization of the 56th Congress in 1899 he was chosen speaker of the house, and re-elected in 1901; he was an impartial presiding officer and took important part in shaping the legislation made necessary by the Spanish war and the acquisition of new territory. In 1902 he declined a unanimous renomination from his district, because he could not support the policy of tariff revision then made a prominent issue by Iowa republicans.

HENDERSON, Isaac, American journalist and novelist: b. Brooklyn, N. Y., 1850, Feb. 13. He was graduated from Williams College in 1872, and the same year joined the staff of the New York *Evening Post*, of which journal he became publisher in 1876. He sold his interest in 1880, and went abroad in 1888, making his home in London and Rome. Author of *The Prelate* (1898); *Agatha Page* (1900); *The Silent Battle; The Mummy and the Humming Bird;* etc.

HENDERSON, James Pinckney, American soldier and politician: b. Lincoln County, North Carolina, 1808, Mar. 21; d. Washington, D. C., 1858, June 4. He practised law in Mississippi; went to Texas in 1836, and became secretary of state of the Texan republic 1837–9. In the latter year he was sent as minister to England and France to secure the recognition of Texan independence, and went to Washington in 1844 to secure annexation. He was a member of the Texas constitutional convention 1845, and the following year was elected first governor of the State. In 1857 he was appointed senator from Texas as a state rights democrat. Henderson fought in the Mexican war and Congress gave him a sword for his gallantry.

HENDERSON, Mary N. Foote, American writer on domestic science: b. New York, 1842. She was married to J. B. Henderson, and in 1876 organized the St. Louis School of Design. She is the author of *Diet for the Sick; Practical Cooking and Dinner Giving;* etc.

HENDERSON, Peter, American horticulturist: b. Porthead, Scotland, 1823; d. Jersey City, N. J., 1890, Jan. 17. He came to America in 1843, and opened a seed-store

in New York city in 1862. He has been called 'the father of horticulture and ornamental gardening in the United States.' He published *Practical Floriculture* (1867); *Gardening for Profit* (1866); *Gardening for Pleasure*(1875); *Garden and Farm Topics* (1884); *How the Farm Pays* (1884).

HENDERSON, Richard, American pioneer: b. Hanover County, Virginia, 1734; d. North Carolina 1785. He studied law and in 1769 was appointed associate justice of the superior court of North Carolina. After the adoption of the Declaration of Independence he declined re-election to the bench, in order to participate in the scheme of the Transylvania Land Company. By this scheme the company organized as a political community with president, legislature, and judges, all the territory lying between the Cumberland River, the Cumberland Mountains, and the Kentucky River. The state of Virginia annulled the deed of sale of this tract of territory which the Cherokee Indians had given to the Transylvania Land Company, but as a reward for the pioneer work of the company, granted them an area 12 miles square on the Ohio River, below the mouth of the Greene River.

HENDERSON, William James, American musical critic and author: b. Newark, N. J., 1855, Dec. 4. He was graduated from Princeton College in 1876, and joined the staff of the New York *Tribune*, the following year becoming musical critic of the New York *Times*. He was associate editor of *The Standard Dictionary* (1892–4), and has published: *The Story of Music* (1889); *Preludes and Studies* (1891); *Sea Yarns for Boys* (1894); *Afloat with the Flag* (1895); *Elements of Navigation* (1895); *The Last Cruise of the Mohawk* (1897); *What is Good Music* (1898); *How Music Developed* (1899); *The Orchestra and Orchestral Music* (1899); *Richard Wagner* (1901); *Modern Musical Drift* (1904); *Pipes and Timbrels*, poems (1905); etc.

HEN'DERSONVILLE, N. C., town, county-seat of Henderson county; on the Southern Railway; about 21 miles south of Asheville and 100 miles west of Charlotte. It is situated in a mountainous portion of the state, but in the valleys are fertile farm lands. The chief industrial establishments are a furniture factory, a tannery, a canning factory, and a lumber yard. Apples and vegetables are among the agricultural products shipped to other markets. Hendersonville has a large number of summer guests owing to the healthfulness of the climate and the beauty of the scenery. Pop. (1910) 2,818.

HENDIADYS, n. *hĕn-dī'ă-dĭs* [Gr. *hen dīă dŭoin*, one by or through two]: a figure of speech in which two nouns are used instead of a noun and an adjective, as 'a mouth of wisdom' for 'a wise mouth'—'craft and subtlety' for 'subtle craft;' the same idea presented by two phrases.

HENDRICKS, *hĕn'drĭks*, Thomas Andrews: 1819, Sep. 7—1885, Nov. 25; b. near Zanesville, O.: lawyer. He graduated at South Hanover College, Ind., 1841, was ad-

mitted to the bar in Chambersburg, Penn., 1843; and settled in Shelbyville, Ind., to practice. In 1845 he was elected to the legislature, 1850–52 to congress as a democrat, 1851 to the Ind. constitutional convention; was commissioner of the U. S. gen. land office 1855–59, defeated for gov. of Ind. 1860, U. S. senator and member of the committees on the judiciary, claims, public lands, and naval affairs 1863–69; was a strong but unsuccessful candidate for the presidential nomination of the democratic party 1868, defeated for gov. 1868, and elected gov. 1872; democratic candidate for vice-pres. on the ticket with Samuel J. Tilden (see ELECTORAL COMMISSION, PRESIDENTIAL) 1876, and elected vice-pres. on the ticket with Grover Cleveland 1884. He had great personal influence in his state.

HEN'DRIX, EUGENE RUSSELL, American Methodist bishop: b. Fayette, Mo., 1847, May 17. He was graduated from Wesleyan University, Middletown, Conn., 1867; and the Union Theological Seminary 1869. Appointed bishop of the Methodist Episcopal Church South, in 1886, he has since made official visits to China, Japan, Korea, Mexico, and Brazil. He is the possessor of John Wesley's manuscript *Journal* written in America 1736–7. He has written *Around the World* (1878); *Skilled Labor for the Master* (1900); *The Religion of the Incarnation* (1903); *The Personality of the Holy Spirit* (1904); etc.

HENGSTENBERG, *hĕng'stĕn-bĕrch*, ERNST WILHELM: conspicuous German theologian; 1802, Oct. 20—1869, May 28; b. Fröndenberg, in Westphalia, where his father was a clergyman. Prepared by his father for the university, he applied himself at Bonn to oriental and philosophical studies, while he was also enthusiastic in the *Burschenschaften*. Though sympathizing thus in his early years with liberal and rationalistic movements in Germany, soon after going to Basel 1823, he came under the influence of the missionary institution there, and, before he had begun the professional study of theology, was drawn into the theological tendency which he afterward represented. Going to Berlin, 1824, as theological *Privat-docent*, he put himself at the head of a rising orthodox party, and, with conscientious devotedness, made the scientific defense of their principles the aim of his labors in the university, and through the press. Though known as a theological author only by two little treatises—*Ueber d. Verhältniss d. innern Wortes zum äussern* (1825), and *Ueber Mysticismus, Pietismus und Separatismus* (1826)—he was made, 1826 extraordinary, 1828 ordinary prof.; and 1829, doctor of theology. Through the press, his influence was exerted chiefly as editor of the *Evangelische Kirchenzeitung*, begun 1827, which still combats rationalism even in its mildest forms, seeking to restore the orthodoxy and church-discipline of the 16th and 17th c. With the same view were written all his principal works; his *Christologie d. A. T.* (3 Bde. 1829–35; 2te Aufl. 1854–57); *Beiträge zur Einleitung ins A. T.* (3 Bde. 1831–39); *Commentar über d. Psalmen* (4 Bde. 1842–45; 2te Aufl. 1850); *Die Geschichte Bileams u. Seiner Weissagung*

(1842); *Das Hohelied Salomonis ausgelegt* (1853); and others are devoted to the defense of the old interpretation and criticism of the Scriptures against the result of modern biblical science in Germany. Hengstenberg's influence in ecclesiastical matters also, which was very great, was employed in the carrying out of the high Lutheran dogmas of the church, of church-offices, and of the sacraments, by persecution of secretaries, by opposition to the union of Lutherans and Reformed, and by attempts to depose from their chairs Gesenius, Wegscheider, De Wette, and other rationalistic teachers in the universities. For 40 years Hengstenberg was the champion of the strictest Lutheran orthodoxy. His latest works were *Evangelium des heil. Johannes* (1869); *Geschichte des Reiches Gottes unter dem Alten Bunde; Das Buch Hiob erläutert* (1870). A number of his works have been translated.

HENGST AND HORSA. See ANGLO-SAXONS.

HEN'LEY, WILLIAM ERNEST, English poet, critic, and journalist: b. Gloucester, 1849, Aug. 23; d. Woking, 1903, July 12. He entered on a journalistic career in London, and in 1877 became first editor of the magazine *London*. He was then editor successively of the *Magazine of Art* (1882–6), of the *Scots*—later the *National Observer*—(1888–93), and of the *New Review* (1893–8). His first publication, *In Hospital: Rhymes and Rhythms* (1888), was inspired by his own experiences as a patient in Edinburgh Infirmary. Its contents were subsequently included in *A Book of Verses* (1888). A second volume of poems *The Song of the Sword* appeared in 1892 (2d ed. as *London Voluntaries* 1893). Both of these books were incorporated in the collection of his *Poems* (1898). Later poetical works were: *For England's Sake* (1900); and *Hawthorn and Lavender, and Other Verses* (1901). Henley collaborated with Stevenson four plays, *Deacon Brodie, Beau Austin,* and *Admiral Guinea* and *Macaire*. He also edited, either alone or in cooperation with others, the following anthologies and collections: *Lyra Heroica* (1891), an anthology of English patriotic verse; *A London Garland: from Five Centuries of English Verse* (1895); *Book of English Prose* (1896); *English Lyrics*, 1340–1809 (1897); *The Works of Lord Byron* (1897); *The Poetry of Wilfrid Blunt* (1896); and *London Types* (1898), and was editor of a series of *Tudor Translations*. The *Centenary Burns* (1896–7) is an important work edited by him with the cooperation of T. F. Henderson. The fourth volume contains an elaborate estimate by Henley of Burns as poet and man, published separately in 1898. His critical work appears at its best in *Views and Reviews: Literature* (1890), and *Views and Reviews: Painting and Sculpture* (1901). Both as poet and critic he was prejudiced and aggressive, but keen, vigorous, and often distinguished in style. A paper on Stevenson contributed to the *Pall Mall* in 1901 aroused much unfavorable comment by its arraignment of Balfour's *Life*.

HENLEY-ON-THAMES, *hĕn'lĭ-ŏn-temz:* town of Oxfordshire, England, on the left bank of the Thames, 35 m.

w. from London. The Thames is here crossed by a handsome bridge. Henley-on-Thames is on a branch of the Great Western railway. There are several charities, and a reading-room and valuable library, open to all ratepayers, bequeathed by Dean Aldrich of Henley, who died 1757 Malting is a principal industry; there are breweries; and there is considerable trade in corn, flour, and timber. Pop. 6,000.

HENNA, n. *hen'na* [Ar. *hinna*]: a name sometimes found with the Arabic article incorporated in the form *Alhenna* or *Alkanna;* applied equally to *Lawsonia inermis* and *L. spinosa*, shrubs of nat. ord. *Lythraceæ*. They differ in little, but that one is unarmed and the other thorny, the latter being also larger. Many botanists unite them into one species, under the name *L. alba*. Henna grows in moist situations throughout n. Africa, Arabia, Persia, and the E. Indies. It is cultivated in many places for its flowers, which are prized for fragrance,y particularl by the Egyptian women; but still more for the sake of the leaves, which abound in coloring matter, and which, being dried, powdered, and made into a paste with hot water and catechu, are very generally used by women throughout the east to stain the nails and tips of the fingers of an orange color; also by men to dye their beards, the orange color being converted into a deep black by indigo; and for dying of the manes and hoofs of horses, and to dye skins and leather reddish-yellow. Powdered henna leaves form a large article of export from Egypt to Persia, and to various parts of Turkey, whence they find their way to northern countries, and even to Germany, to be used in dying furs and some kinds of leather. The use of henna for staining the nails appears—from allusion in ancient poets, and from some of the Egyptian mummies—to have prevailed from very ancient times.

HEN'NEGAU. See HAINAULT.

HENNEPIN, *hĕn'ē-pĭn*, LOUIS: about 1640–1706; b. Ath, Belgium: explorer. As a member of the order of Recollets of St. Francis, he performed missionary service in Italy, France, and Canada; founded a convent at Fort Frontenac 1676; became a chaplain in La Salle's exploring expedition; and reached the outlet of Niagara river 1678, Dec. 6. He then took a canoe, discovered the great cataract, offered the first mass in that region, and made his way through the great lakes to Mackinaw 1679, Aug. 26. In Feb. following he started in a canoe from La Salle's Fort Crevecœur (Peoria, Ill.), passed down the Ill. river to its mouth, and then up the Miss. river till captured by Sioux Indians who took him to their country (Minn.) 1680, Apr., where he discovered the falls of St. Anthony and remained nearly a year. He returned to Quebec 1682, Apr., soon afterward went to Paris to publish a narrative of his travels, and settled in Holland 1697. His chief works are: *Description de la Louisiane nouvellement découverte au Sud-ouest de la Nouvelle France*, etc. (Paris, 1685); *Nouvelle Dé-*

couverte d'un trés-grand Pays situé dans l'Amerique, entre le Nouveau-Mexique et la Mer Glaciale (Utrecht 1697); *Nouveau Voyage dans un Pays plus grand que l'Europe*, etc. (Utrecht 1698). His claim to having explored the Miss. to its mouth has been disputed and maintained by eminent scholars.

HENNESSY, *hĕn'nē-sē*, JOHN; an American clergyman; 1825, Aug. 20—1900, March 4; b. in Ireland; came to the United States, 1847; studied theology at Carondelet Sem; labored as Rom. Cath. miss.; prof. at Carondelet Seminary, 1854, and president, 1857; afterward had charge of a parish in St. Joseph, Mo.; and became bishop of Dubuque, 1866, and archbishop, 1893.

HENNESSY, JOHN JOSEPH, American Roman Catholic bishop: b. County Cork, Ireland, 1847, July 19. He came to America in early life and was graduated at the Christian Brothers' College, St. Louis, Mo., in 1862. He was ordained priest in 1869; founded the Railroad Men's Benevolent Union 1871; established the Ursuline convent, Arcadia, Mo., 1877; and edited *The Youth's Magazine*, St. Louis, 1880–6. He was consecrated bishop of Wichita, Kan., in November 1888.

HENNI, *hĕn'nē*, JOHN MARTIN, D.D.: 1805, June 13—1881, Sep. 7; Obersanzen, Switzerland: Rom. Cath. archbishop. He studied in the St. Gall and Zurich gymnasia, came to the United States as a missionary 1827, completed his studies at the Bardstown Seminary, Ky., was ordained priest 1829, Feb. 2, and appointed pastor of Holy Trinity Church in Cincinnati and vicar-gen. of the diocese 1834. In 1844 he was consecrated first bp. of the newly-created diocese of Milwaukee, 1853 consecrated his cathedral, 1875 became abp. of the new see of Milwaukee, and 1880 was given a coadjutor, Michael Heiss (q.v.).

HEN'NIKER, HON. MRS. ARTHUR, English novelist. She is a daughter of Richard Monckton Milnes (q.v.), 1st Baron Houghton, and was married to Hon. Arthur Henniker in 1882. Her books, which have had an American as well as English circulation, include: *Sir George* (1891); *Foiled* (1893); *Outlines* (1894); *In Scarlet and Gray* (1896); *Sowing the Sand* (1898); *Contrasts* (1903); *The Courage of Silence*, play (1905); etc.

HEN'NINGSEN, CHARLES FREDERICK, American military officer: b. in England, of Swedish parents, 1815; d. Washington, D. C., 1877, June 14. He joined the Carlists in Spain in 1834, and later was a follower of Kossuth in the Hungarian revolution. He went to Nicaragua in 1856, where he distinguished himself in the defense of Granada, and in the victory at Queresma. During the civil war he served in the confederate army, becoming a brigadier-general. He directed the construction of the first Minie rifles manufactured in the United States. His publications include *Eastern Europe; Past and Future of Hungary; Sixty Years Hence; Personal Recollections of Nicaragua; The White Slave;* etc.

HENOTIKON, n. *hē-nō'tĭ-kŏn* [Gr. *henōtikos*, serving to unite; *henoō*, I unite]: formula of concord set forth by the Greek Emperor Zeno, 482, by advice of Acacius, Bishop of Constantinople, to reconcile the Eutychians to the church. Being thought to favor the Eutychian party, it was annulled by Pope Justin I. 518. See EUTYCHES; MONOPHYSITES.

HENRI, ROBERT, American painter: b. Philadelphia, Pa., 1865. He began his art studies in his native city and became an instructor in the Philadelphia School of Design. He has exhibited in Paris, and his picture *Snow* was purchased by the French government and hangs in the Luxembourg. While in Paris he gathered round him a group of pupils in his studio, and as a landscape painter did much to impress younger men with his breadth and vigor of style. While he is a landscape painter of notable attainment, his portraits also are admirable for the power of individualization and the directness which characterizes them.

HENRICIANS, n. *hĕn-rĭs'ĭ-ănz:* anti-sacerdotal sect, followers of Henry the Deacon, or Henry of Lausanne (or of Clugny), an eremite monk born toward the end of the 11th c., probably of Italian descent, who abandoned the cloister because of its prevalent immorality, and came from Lausanne in Switzerland to France. He declaimed with fervid eloquence against the views of the clergy and caused tremendous excitement, sometimes drawing whole congregations from their churches to follow him. For a time Henry cast his lot with Peter de Bruys, who had begun an attempt at religious reform about 1110 and who was burned by a furious mob at St. Giles 1130. Henry did not share the tenets of Peter, through agreeing with him in a crusade for reform. Peter de Bruys opposed infant baptism, inveighed against all church-buildings and demanded their destruction, and denied all sacramental character in the Lord's Supper, and all authority in the priesthood. His followers, known as *Petrobrusians*, after his violent death, joined the sect of the Henricians, whose leader, Henry the Deacon, was driven from place to place by the ecclesiastical authorities, and died in prison 1148. Remnants of the sect seem to have continued till the end of the 15th c.

HENRIET'TA, Texas, town, county-seat of Clay county; on the Little Wichita river, and on the Missouri, K. & T., and the Fort Worth & D. R.R.'s; about 90 miles northwest of Fort Worth and 128 miles northwest of Dallas. It is situated in an agricultural and stock-raising region, and the building-stone quarries in the vicinity add to the industrial wealth of the town. The chief manufactures are flour and lumber. The town has cotton-gins, grain elevators, lumber-yards, and stock-yards. The trade is chiefly in live stock, grain, flour, lumber, cotton, and building-stone. Pop. (1910) 2,001.

HEN'ROTIN, ELLEN M., American social reformer; b. Portland, Maine, 1847, July. She was educated in Europe and in 1869 was married to Charles Henrotin, Belgian

consul at Chicago. In 1893 she was vice-president of the Congress Auxiliary of the World's Columbian Exposition; the same year she was decorated by the Sultan of Turkey with the order of Chafkat and made an Officier de l'Academie by the French Republic, 1899. She was president from 1894 to 1898 of the General Federation of Women's Clubs.

HENRY: the unit of inductance. See ELECTRODYNAMICS in ELECTRICITY, PRINCIPLES OF, and UNITS, SCIENTIFIC.

HENRY, *hĕn'rĭ*, I., King of England: 1068–1135, Dec. 1 (reigned 1101–35); youngest son of William the Conqueror. When his brother, William II., was found dead in the New Forest, where they had both been hunting, in 1100, Aug. 2, with a broken arrow in his breast, Prince Henry at once seized the government, which, according to the then but imperfectly understood law of primogeniture, should have passed to his elder brother, Robert, Duke of Normandy, who was at that time in Italy, on his way home from crusading in Palestine. Henry was crowned at Westminster, the third day after his brother's violent death. He instituted no inquiry regarding the death; and he successfully held the crown against his brother Robert, at first negotiating with him and granting him a pension to resign his pretensions, but finally making war on his badly-governed duchy. Robert was defeated in a bloody battle before the walls of Tenchebray, 1106, Sep. 28, taken prisoner, and shut up in Cardiff Castle during the remaining 28 years of his life. The acquisition of Normandy, the ancient patrimony of his family, had been a point of ambition with Henry, as he despised England and the English; but he had some trouble in keeping it as the French king, Louis VI., and the Counts of Anjou and Flanders, took part with William, Robert's youthful son, whose virtues and misfortune secured him friends. Henry, however, brought over to himself the Count of Anjou, by betrothing his only son to the count's daughter; he rendered neutral, by his elegant and fair promises, Pope Calixtus II., whose intervention in the interest of justice had been besought; and he defeated the French king and his mailed knights in the almost bloodless battle of Brenneville, 1119. Next year his successes in arms and intrigue were darkened for life by the death of his only son William, who was drowned at sea on his passage from Normandy to England, unregretted by the English, who knew of his hatred toward them, his arrogance, and his gross vices. Henry himself died from a surfeit of lampreys, as he was preparing to leave Normandy, to repress an incursion of the Welsh. He was very anxious that his daughter Matilda, who had married Geoffrey Plantagenet, the boy Count of Anjou, on the death of her first husband, Henry V., Emperor of Germany, should succeed him on the throne, and had twice made the English nobles swear fealty to her; but on his death the crown was seized by Stephen of Blois, son of Adela, the Conqueror's youngest daughter.

Henry I. was styled Beauclerc, or the Scholar, in honor of his learning, which, for a king in that age of ignorance, was something beyond the common. He had great natural ability, especially in state intrigue. Law was administered with considerable fairness, and not a little rigor, during his reign, and his administrative ability restrained the spirit of rebellion which had been seething incessantly since the Conquest. The punishment of crimes during his reign was capricious and barbarous; death, the loss of eyesight (which he is alleged to have inflicted on more than one of his relatives), and perpetual imprisonment, being the most usual penalties of the law.

HENRY II., King of England: 1133, Mar. 5—1189 July 6 (reigned 1154–89); b. Le Mans, France; grandson of Henry I. by his daughter Matilda, and her second husband, Geoffrey Plantagenet. His mother, assisted by her illegitimate brother, the Earl of Gloucester, in the early part of Stephen's reign, and toward its close by Henry himself, had made war against Stephen, as a usurper, who had no good title to the throne. In 1153, when the rival armies were drawing near each other, a treaty for a compromise was set on foot, and in the course of it the only son of Stephen having died, it was agreed that Stephen should reign during his life, and that Henry should succeed him, which he did on Stephen's death next year. He was crowned 1154, Dec. 19, with his queen, Eleanor, whom at the age of 18 he had married within six weeks after she had been divorced by Louis VII. of France. She was Countess of Poitou, and Duchess of Aquitaine, in her own right. Henry inherited from his father Anjou, Touraine, and Maine, and his father and mother succeeded by force of arms, in keeping and taking possession of Normandy for themselves and him; so that, by one method and another, he came to be possessed of a large portion of France as well as England. His chief rivals in power were the clergy, who could use their weapon of excommunication with terrible effect, and who being tried by their own courts were not amenable to the common laws of the realm, and were protected from the punishment due to their crimes, which were often of the deepest dye. To aid him in reducing the church to subjection to the civil power, he appointed his trusted chancellor, Thomas-à-Becket, to the see of Canterbury, and compelled him and the other ecclesiastics to agree to the 'Constitutions of Clarendon;' a set of laws enacted by a sort of prototype of a parliament, or council of the barons, and having for their object to render the crown and the civil law (such as it had grown to be) superior to the church. Becket, however, proved to be a true churchman, and the long and obstinate struggle between him and his monarch ended in his murder (see BECKET, THOMAS A). Henry did penance at his grave, allowing himself to be scourged by monks; but though the 'Constitutions of Clarendon' were formally repealed, the king was ultimately successful in reducing the church to subordination in civil matters. During his reign occurred the conquest of Ire-

land. That country was then the home of a number of tribes or clans of the ordinary feudal type, and Pope Adrian IV., 1156, by a bull, gave Henry authority over the entire island, and ordered the inhabitants to obey him. He had not leisure at the time to conquer them, but afterward, English aid being solicited by one of the Irish petty kings, Dermot of Leinster, Henry gave leave to any of his subjects to aid him; and Robert Fitzstephens, constable of Albertvivi, Maurice Fitzgerald, and Richard de Clare, surnamed Strong-bow, Earl of Strigul, went over with a very few hundred trained Englishmen, and in one year conquered Ireland. They succeeded so well that Henry became jealous, and recalled them; and next year (1172) he went over himself, to conquer in a royal way, and was everywhere loyally received, except in Ulster. This was the nominal conquest of Ireland, but the majority of the Irish tribes and chieftains continued to be independent barbarians for centuries.

During this reign, also, the first considerable ascendency of England over Scotland was gained. Henry's sons, incited by their jealous mother, Queen Eleanor, rebelled against him, and their cause was espoused by the kings of France and Scotland. The latter, William the Lion, was ravaging the north of England with an army, when he was surprised at Alnwick, and taken prisoner 1174, July 12. To obtain his liberty, he stipulated to do homage to Henry for Scotland, to cede forever to him the fortresses of Roxburgh and Berwick, and the castle of Edinburgh for a limited time. In the course of this filial rebellion, Henry, the eldest son, died of a fever, exhibiting great remorse, and Geoffrey was killed in a tournament at Paris. Richard, surnamed Cœur de Lion, with King Philip of France, obtained some advantages over his father. A treaty of peace was concluded between them, of which one of the stipulations was for an indemnity for all the followers of Richard. The sight of the name of his favorite son John in the list, acting upon a constitution weakened by many cares, threw the king into a fever, of which he died.

In general, Henry was an able and enlightened sovereign. The barons were indeed overawed, but the monarch did not use his power despotically. Law made very great progress in his reign; circuit courts were established, and other improvements effected. The earliest writer on English law, Ranulph de Glanville, was Henry's chief justiciary. In intellect and character, Henry resembled his grandfather, Henry I., but his violations of the moral law were fewer, and less heinous. Still he had some illegitimate children, his mistress, the fair Rosamond, being the mother of two that are remembered: William Longswood, Earl of Salisbury, and Geoffrey, who became Abp. of York, and who was faithful to him when his four legitimate sons took up arms against him.

HENRY III., King of England: 1207, Oct. 1—1272, Nov. 16 (reigned 1216–72); grandson of Henry II., and eldest son of King John. He succeeded to the throne at his

father's death. He inherited his father's weakness, and he managed everything ill both at home and abroad. A war with France cost him Poitou, and might have been more disastrous, but for the virtuous disposition of the French king, Louis IX., commonly called St. Louis. In his boyhood, under the direction of the judicious Earl of Pembroke, Henry ratified the Magna Charta; and he did so in manhood, to appease the discontent of his parliament, and obtained allowances of money. But he kept no vows. He was beset with favorites chiefly from the country of his queen, Eleanor of Provence, and he allowed exorbitant exactions on the part of the clergy and the pope. His misrule roused the people and the barons in parliament, headed by his brother-in-law, Simon de Montfort, Earl of Leicester, who forced him to transfer his power temporarily to a commission of barons. He agreed to this by the provisions of Oxford 1258. The barons were somewhat tardy in reforming the state, and the king desired to regain a power which he alleged, with truth, had been taken from him by compulsion, though wearing the appearance of free-will. The question of the validity of these provisions was submitted by both parties to St. Louis of France, whose conscientiousness was such that foreigners could trust him. He annulled the provisions. Leicester and his party disregarded their agreement to be bound by his judgment, and took up arms against the king. They defeated him, and took him prisoner in the battle of Lewes, 1264, May 14. The battle was followed by an agreement called the Mise of Lewes, more humiliating to the king than the provisions of Oxford. Leicester, being virtually king, summoned a sort of parliament; and to extend his popularity, already great, he intimated that boroughs should be represented, and this kind of representation was realized in embryo for the first time in English history. But his supremacy did not last long. Within a year, the powerful Earl of Gloucester deserted his party, and enabled Prince Edward, the son of the king who had been taken prisoner at Lewes, to escape from captivity. They led an overwhelming army against Leicester, who was defeated and slain at Evesham, 1265, Aug. 4. At the king's death, he was succeeded by his son Edward. The weakness of Henry and his father had allowed the development of the power of the barons, and the counterpoise of these two forces, regal and aristocratic, was approached in these reigns by a method which has developed into the British parliament. Statute law dates from the time of Henry III.; the 'Provisions of Merton,' passed in the 20th year of Henry's reign, being the first enactment on the English statute-book.

HENRY IV., King of England: 1366–1413, Mar. 20 (reigned 1399–1413); only son of John of Gaunt and of Blanche, daughter of Henry, Duke of Lancaster. He usurped the throne on the deposition of his cousin Richard II. by the parliament. He was surnamed Bolingbroke, from the place (in Lincolnshire) where he was born 1366, and had no valid title to the crown, or pretense of it, ex-

cept that he was the son of the fourth son of Edward III. The peace of his reign was disturbed by the Welsh, under Owen Glendower (q.v.), and by the Scotch, who were defeated, however, at Nesbit Moor 1402, June 22, and at Homildon Hill, Sep. 14. Henry Percy (surnamed Hotspur), conqueror in the latter engagement, and his family shortly after broke with the king, and leagued with the Scotch Earl Douglas and Glendower against him: but this coalition was destroyed by the battle of Shrewsbury 1403, July 21. Other two insurrections followed, which were easily suppressed. The king became afflicted with leprosy and epilepsy, and died of a fit in Westminster Abbey, in the 47th year of his age, having found a usurped crown a heavy burden, even for a strong head. The parliament exercised great and unwonted powers in the reign of this king, who had at least the wisdom to see, that for the maintenance of the government which he had usurped, something of the nature of a constitutional basis was requisite.

HENRY V., King of England: 1387, Aug. 19—1422, Aug. 31 (reigned 1413-22); b. Monmouth (whence his surname); son of Henry IV. whom he succeeded. In his youth he had acquired great military distinction in operations against Glendower, and after his military work was ended by his father's jealousy and distrust of him, he became noted almost equally for dissipation. But when he became king (1413, Apr. 21), he shook himself in great measure free of bad habits and companions, and in an endeavor at the outset of his reign to be both just and generous, he liberated from the confinement in which his father had placed him the young Earl of March, who was the true heir to the crown, and restored the son of Hotspur to the lands and honors which Hotspur had lost by rebellion. He paid a tribute to the orthodoxy of the age, by persecuting the Lollards by fire and halter. The great effort of his reign was an attempted conquest of France, in which he virtually succeeded. He had no right to the French crown; but in these days of usurpation and unsettled laws of succession, when might and right were practically identical, he seems to have brought himself really to believe that he had a right. In his first campaign to vindicate it, he besieged and took the town of Harfleur, and gained the battle of Agincourt (q.v.), 1415, Oct. 25, against such enormous odds as to make his victory one of the most notable in history. Two years later, he again invaded France, and made Normandy once more subject to the English crown. An incapable king and civil discord there aided him greatly. 1420, May 20, there was ratified at Troyes 'perpetual peace' between Henry and the French. Henry demanded and had conceded to him the regency of France, the eldest daughter of the king and queen to be his queen, and the succession to the French crown on the death of the king. He had hardly returned to England, and been married to this French princess, Catherine, when the defeat at Baugé, 1421, Mar., of his

brother the Duke of Clarence, whom he had left gov. of Normandy, by a force consisting largely of Scotch, and commanded by the Scotch Earl of Buchan, who killed the duke with his own hand, rekindled the hopes of the French, who supported the contention of Charles the dauphin against the treaty of Troyes, to which he had not agreed. Henry returned to France for a third campaign, and his wonted success in arms was following him,when he was seized with illness, of which, after one month, he died, in the 34th year of his age, leaving an infant to succeed him, and a splendid reputation for all those qualities that constitute a magnanimous monarch.

HENRY VI., King of England: 1421, Dec. 6—1471, May 21 (reigned nominally, 1429–61); b. Windsor; only child of Henry V. and of Catharine of France. As he was not quite nine months old when his father died, his uncle John, Duke of Bedford, was appointed to govern France and another uncle, Humphrey, Duke of Gloucester, to be 'Protector of the realm and Church of England,' with a counsel appointed by parliament to aid and control him, the parliament declining to appoint him regent, though the late king had desired it. The incapable Charles VI. of France having died, his son the dauphin assumed the title Charles VII., and went on fighting with the English. His army, commanded by the Scotch Earl of Buchan, who had been appointed constable of France for his victory over the Duke of Clarence in the previous reign, and consisting of 14,000, half Scotch and half French, was almost annihilated by the English under Bedford, at Verneuil, 1424, Aug. 27. The Scotch auxiliaries ought not to have been there, as peace had been made with the Scots a year before, and their young king, James I., had been set at liberty, after a captivity of 20 years, and had returned to his kingdom with Lady Jane Beaufort, daughter of the Duke of Somerset, and relation of the royal family, as his queen.

The victory of Verneuil was the last great success obtained by the English in France, and their power, which only force could support or justify, gradually crumbled down. In 1428, they laid siege to Orleans, but the siege was raised next year by the French, inspired by Joan of Arc (q.v.); and though she was burned as a witch by the English 1431, their power continued to decline. Normandy was completely lost by the fall of Cherbourg 1450; and ultimately, 1453, they were expelled from all France (Calais excepted), greatly to the advantage of both that country and England.

Disputes between Gloucester, the regent, and his uncle, the powerful Bishop of Winchester, as well as war with France, prevailed during the minority of the king. As he grew up, he manifested no tendency to either vicious or intellectual activity. He inherited, in fact, the imbecility of his grandfather, Charles VI. of France. In 1445, the weak king found a wife in the strong-minded Margaret of Anjou; and 1447 the Winchester party, supported by her, succeeded in having Gloucester thrown into prison for high-

treason, where he was soon found dead in his bed, without external mark of violence, but most likely murdered, as Edward II. had been, by thrusting a red-hot iron through his bowels. Winchester did not long survive his nephew and rival; and 1450 the Duke of Suffolk, the queen's favorite minister, being impeached by the commons, was condemned to be banished from the kingdom, but was shortly afterward taken, and executed on board one of the king's ships. The want of strength in the king, as well as in his title to the crown, was an invitation to every form of faction to display itself. Jack Cade, an Irish adventurer, who pretended to be a Mortimer, obtained temporary possession of London; but the citizens overcame him and his pillaging followers, and he was taken and beheaded in a garden by the sheriff of Kent. The true representative of the Mortimers was Richard, Duke of York, and he was one of the unquiet spirits of the reign. As a descendant of Lionel, Duke of Clarence, third son of Edward III., his title to the crown was superior to that of the king, who was descended from the Duke of Lancaster, fourth son of that monarch; and he laid claim to the crown with more or less openness, according to circumstances. His influence and address was so great that 1454, on the occasion of the king's weak mind being entirely eclipsed, he was appointed protector by parliament. On the king's recovery he was indisposed to give up his power, and levied an army to maintain it. 1455, May 22, the battle of St. Albans was fought, and the Yorkists were victors: 5,000 of the supporters of the house of Lancaster being killed, the Duke of Somerset, the queen's favorite minister for the time, being among them; and the king himself being taken prisoner. This was the first of 12 battles between the houses of York and Lancaster, in the wars commonly called the Wars of the Roses, from the emblem of York being a white rose, and of Lancaster a red rose. (For a brief account of the struggle, see EDWARD IV.) In his cradle he was proclaimed king of both France and England; but he lost both, having in intellect scarcely advanced from his cradle all his days, though throughout amiable and of good intentions.

HENRY VII., King of England: 1456, Jan. 21—1509, Apr. 22 (reigned 1485–1509); b. at Pembroke Castle, the seat of his father, the Earl of Pembroke. Henry was the conqueror and successor of Richard III. His father, Edmund Tudor, was son of Owen Tudor, and of his wife, Queen Catharine, widow of Henry V: his mother was granddaughter of John of Gaunt, parent of the house of Lancaster, and through her he derived his right (such as it was) to the crown. He was, indeed, the nearest heir, after Richard III. had murdered his nephews, the sons of Edward IV., except their sister Elizabeth, and Richard himself. The popular detestation against Richard's crimes was so great in England, that Henry while residing abroad and bearing the title of Earl of Richmond, was invited to invade England, and rescue it from the tyrant. 1485, Aug. 7, he landed

at Milford Haven, and marched across the country to Bosworth, Leicestershire, where a battle took place Aug. 22, in which Richard was slain. Henry then ascended the throne. His reign was troubled by several imposters claiming the crown: first, Lambert Simnel, a joiner's son, who professed to be Earl of Warwick, was proclaimed king in Ireland, but was defeated at Stoke 1487, taken prisoner, and turned into a scullion in the king's kitchen by Henry, who had a talent for turning everything to the most profitable purpose; second, Perkin Warbeck, who pretended to be the boy Duke of York, who had *not* been murdered in the Tower by Richard III., and was patronized by the Duchess of Burgundy, and supported by James IV. of Scotland, but was finally captured; and third, Ralph Wulfurd, who also pretended to be Earl of Warwick, but did not succeed in carrying his enterprise far, being almost at once taken and hanged 1499. In this year Henry, apparently to free himself from further trouble from pretenders, had Warbeck whom he had pardoned, and the true Earl of Warwick, a youth who had known only captivity all his days, convicted of a plot to recover their liberty, and put to death. The execution of the latter is the chief blot in Henry's conduct, but his execution of Lord Stanley, who had helped him to the throne, also showed a callous heart. Indeed, this king was cunning and selfish, though prudent and not intemperate in revenge or in any vice except avarice, which led him to sell offices and pardons, commuting sentences passed by his corrupt and infamous exchequer judges, Empson and Dudley. His avarice kept him from engaging in foreign war, a very small quarrel with France being all that he attempted in that way. It kept him also from returning the dowry of Catharine of Aragon, who had married his son Arthur, Prince of Wales, a boy of 14, just before he died, and led him to betroth her to his next son, who became Henry VIII., a betrothal from which flowed most important consequences. He married his eldest daughter, Margaret, to James IV., of Scotland, foreseeing that it might bring about a union of the crowns; and this was one of the most fortunate and prudent schemes of his reign. His wife having died, he was engaged looking out for another for himself, with a large dowry, when he died of consumption. Bacon wrote a history of his reign, in which he represents him as a wise king, but does not conceal his avarice, explaining it rather by observing that the necessities and shifts of other great princes abroad set off to him the felicity of full coffers. Hume reckons his reign 'the dawn of civility and science' in England. Bacon says that in it 'justice was well administered, save when the king was partie.' Some fresh light is thrown upon this and the preceding reign by the recent publication of state papers.

HENRY VIII., King of England: 1491—1547, Jan. 28 (reigned 1509–47); second son of Henry VII. and Elizabeth of York. On the death of his elder brother Arthur 1502, he became heir-apparent to the throne. In his 12th year, he was betrothed to his brother's widow, Catharine of Ara-

gon, sister of Philip I. of Spain, thus early commencing a union afterward so fertile in evil-fortune. On his father's death, 1509, Henry was found to possess many accomplishments, with no practical ability. Leaving Dudley and Empson, the instruments of his father's economic extortions, to fall a sacrifice to popular indignation, he proceeded to squander his treasures to his own high satisfaction, and to the great content of his people. He indolently allowed his ministers to manage everything for him, even to his marriage with Catharine. But though he knew nothing of the foreign relations of his kingdom, he could speak several languages with ease; and though he despised domestic business, never was there a monarch who presided more gracefully in the court, or behaved more gallantly at the jousts or in the hunting-field. His tastes were otherwise innocent. He was passionately fond of music and of display, and he indulged in no other excess than that of physical exercise, sometimes, it is said, exhausting four or five horses in the field in one day. It is especially noteworthy that the early years of the king were spent with scarce a stain on the purity of his life.

For the first 20 years of his reign, England had no reason to be dissatisfied. The period, indeed, was not eventful. In the beginning of it (1513), there were two short wars—one with France, in which Terouenne and Tournay were taken, and one with Scotland, in which the victory of Flodden was won. The following years were of that calm which comes before the storm. Wolsey was then minister, and from 1515, when he was made Abp. of York and chancellor, till his fall 1529, he was wholly responsible for the government, and it was the best governed portion of Henry's reign. The foreign policy, it is true, was somewhat tortuous, guided to some extent, perhaps, by the aspirations of the cardinal to the triple crown; and it may be that, in his home-government, Wolsey often exhibited a jesuitical preference for accomplishing honest ends by dishonest means. The country, notwithstanding, was kept free from foreign embarrassments, and, at home, justice was administered.

Of the king, it cannot be said that during this period he did anything of consequence. When satiety and diminished means had checked the pursuits of his youth, he had betaken himself to those well-known theological studies which earned for him (1521) the honor of Defender of the Faith. His book, in defense of the seven sacrements, against Luther, though a work of some erudition, contributed nothing to the solution of the questions which it discussed. Its timidity in examining received opinions was accompanied by corresponding vigor in denouncing those who, possessed of more courage, had proceeded from examination to dissent.

It is impossible not to connect these theological studies with the origin of the suit between Henry and Catharine. The joyous temperament of Henry had passed away, and in its place had come discontent and gloom. In his now

superstitious mind, the fancy dwelt that the early deaths of all his male children had been the judgment of Providence on some sin. From these dark thoughts the queen had not the power of weaning him. Older by six years than he was, her beauty had faded, and, haughty in her manners, she exacted all the stately etiquette of the Spanish court from one who had at no time felt for her more affection than was due to a bride selected for him by others, The nation, too, had grown dissatisfied with the union. The prospect of a succession left to be disputed around the person of a girl—the Princess Mary, who was the immediate heiress to the throne—was viewed with anxiety. Men remembered the horrors of the wars of the Roses, and feared that their children might see them repeated. The doubt as to the validity of Henry's marriage with his brother's widow, which had been started at the time of its celebration, was one certain to be revived on the slightest occasion. A strange mixture of public spirit, religious or superstitious feeling, discontent, and selfish desire, now determined Henry to seek a divorce.

In suing for the divorce, the king unexpectedly found a zealous assistant. Wolsey saw in it a means of detaching England from the alliance with Spain, odious to him as the power that thwarted his ambition and ruled the papacy while pretending to obey it. Already his acute mind saw that the influence of the priesthood was decaying. Enthusiast as he was, he believed he could restore it. While sounds of reformation were echoing from Germany from beyond the walls of the church, Wolsey, almost alone in England, saw the danger; but he believed there was strength enough within the church to accomplish her own amendment, and he trusted now that the lost affections of the people might be brought back by a gracious exercise of the dispensing power, freeing them from a visible danger. Already the active schemer had arranged that, when the work was done, the king should marry a daughter of France, converting an old enemy into a strong ally. With such ends in view, Wolsey (1527) prosecuted the divorce before Clement.

The pope found himself in difficulty. On the one hand, Francis I. supported England; on the other Charles V. threatened. Clement pursued the traditional policy of Rome, and temporized. To gain time, he issued a commission to Cardinal Campeggio and to Wolsey to try the question. Meanwhile, Wolsey's fair projects were rendered impossible. Anne Boleyn had been for many years about court, and, when Henry's conscience grew too scrupulous to permit his cohabiting longer with Catharine, Anne lived constantly with him. When the king announced his intention of marrying her, Wolsey's desire for the divorce was at an end. The connection promised little to the nation, and he himself had every reason to dislike her, as her relatives belonged to those reformers who sought reform from without, and as such religious sympathies as could find a place in her frivolous mind leaned also to the new

learning. He was now as anxious to procrastinate as Clement. The legates' court had been opened, argument had been heard; but on one excuse or another, judgment was delayed till the changeable Clement revoked the commission, and (1529) advocated the cause to Rome.

The revocation of the papal commission to try the divorce question virtually ended the papal power in England; and the steps that followed were merely the working out of inevitable results. Wolsey, suspected on the best grounds of having thwarted the divorce, was deprived of power, and a new ministry was formed (1529, Oct.), in which, for the first time, laymen held the highest places. Sir Thomas More was chancellor. The chief adviser of the king was Wolsey's old servant, Thomas Cromwell (q.v.). Parliament was called, and the members, finding that royal approbation was now given to their complaints, made out a formal list of grievances against the clergy. Their humble petition to his majesty set forth how the bishops cared for nothing but the episcopal revenues, and how they converted everything, from the powers of the diocesan courts downward, into a machinery for money. The king solemnly sent the document to convocation, and while the reply was under consideration, the commons proceeded. Bills were passed, with little opposition, dealing with what were wont to be thought purely ecclesiastical matters, such as fixing the fees to be exacted in the probate courts, and abating some peculiar obnoxious imposts made in performing the last ceremonies for the dead. Parliament touched the clergy more closely still when they forbade them to follow secular employments or to hold pluralities, and enjoined them to live in their parishes and perform their duties. These bills passed the lower house with little opposition; in the upper house, where the spiritual lords were numerous, they passed with difficulty. The king gave his assent willingly. When the bills became law, they were received by the people with great satisfaction.

Though these measures were significant enough of what might follow from the pope's refusal, the pope still delayed. Time was suffered to wear on, and nothing made progress except the unpopularity of the clergy. Rome still showing no symptons of yielding, the king's political necessities again made him a reformer, and that of a very unscrupulous kind. He imposed a heavy fine on the clergy, under an old statute, for having recognized the legatine authority of Wolsey without express royal sanction. Going still further, the Defender of the Faith declared himself the head of the church, and induced the clergy to recognize the title in consideration of his graciously remitting a portion of their fine (22 Hen. VIII. c. 15).

Parliament having again met (1530), advantage was taken of the king's disposition still more to limit the clerical power. The clergy had long ago forced the state to give up to them the right to try their brethren when accused of crimes. Their theory was that he on whom consecration had wrought its mystic office was too high for the secular

arm. The practice was that every one who claimed the character of clerk, from the highest dignitaries of the church to the crowds of mendicant friars, escaped with small fines after committing the gravest crimes. Parliament was thought to have gone far when it enacted that all below the rank of priest should be dealt with by the ordinary courts of the realm. The same parliament passed other acts, regulating the jurisdiction of the ecclesiastical courts, and making stricter provisions against bequests to the church.

These measures, bold and unusual as they were, affected Rome only indirectly. As it was evident that something to be more closely felt was requisite, one of the pope's highest and most lucrative privileges was attacked. The pope had long maintained that no high ecclesiastical dignity could be conferred without his approval; and in return for granting it, he received the first year's fruits of the benefice. These payments, called annates, amounted to a large sum, increased even beyond its legitimate amount by the dishonorable expedient of sanctioning the appointment of none but very old men. A bill passed both houses, abolishing these payments (23 Hen. VIII. c. 20). To make the measure serve its purpose more effectually, power was given to the king to call it into effect at any future time, while the hope was privately held out that this power would not be exercised if the divorce were granted.

While such measures were being passed, it may be believed that Sir Thomas More held office with pain and reluctance. Finding at last his influence powerless to restrain the advancing tide of secularism, he resigned, and a ministry was formed (1532) of which Thomas Cromwell was now the nominal as well as real head. The new ministry were prepared to push measures of reform as far as the temper of the king and the nation would permit. They desired nothing better than an open rupture with Rome. Henry on the other hand, exhausted every effort of diplomacy to preserve the alliance with the church. Embassies, intrigues, plots of all kinds, in Paris and Rome, abounded in endless confusion at this time, making it impossible to determine the immediate cause of the separation, which had long since become certain to ensue.

In the beginning of 1533, Henry, either impatient at the long delay, or as others say, and as the dates render not improbable, discovering that his illicit intercourse with Anne Boleyn had resulted in her pregnancy, was privately married to her. Within three months afterward, the marriage was made public; and to complete matters, Cranmer, recently appointed Abp. of Canterbury, held a court, as the highest ecclesiastical authority in England, and pronounced sentence of divorce, declaring the marriage of Henry and Catharine to have been null from the beginning. In England these doings were accompanied by much rejoicing, and the king's former taste for pageantry revived in the magnificent ceremonial of crowning his new queen.

The news produced other effects in Italy and Germany.

When the news of the marriage reached the Vatican, Henry was cited to appear before the papal court. He refused, and appealed to a general council. When Cranmer's sentence reached Rome, the pope at once declared it illegal, and soon afterward almost closed the door for further negotiations by rejecting the appeal to the council. The next steps on each side were taken almost simultaneously. The English parliament met, and under Cromwell's guidance, far outdid its predecessors. It passed an act entirely abolishing the papal authority within the realm (24 Hen. VIII. c. 12), giving the king, as on a former occasion, power to call the act into operation when he pleased. It then settled the succession on the issue of Anne Boleyn, to the exclusion of that of Catharine. Scarcely had these measures passed, when news came from Rome that the pope had pronounced judgment in the long pending divorce case, finding Henry's marriage to Catharine to have been valid. On the day following, Henry called into operation the act abolishing the pope's authority.

Henry having as yet done comparatively little to forfeit his early popularity, had the popular sympathy in the steps taken against those of his subjects disaffected with these changes. Among these steps, however, were some not easily defended, even according to the standard of the times. Minor victims fell unheeded, but all Europe was shocked when More and Fisher (Bishop of Rochester)were put to death for refusing to acknowledge the new succession, and to admit the king's right to the headship of the church. Even Henry's ally, Francis I., remonstrated. The worst effect of the cruelty was the alienation of the German Protestants, who ever afterward held aloof from Henry in spite of all Cromwell's efforts to cement an alliance. After this and similar acts, not infrequent, it may be said that Henry never again received human sympathy. He pursued his course, however, aided by those from whom the dust of the conflict concealed his cruelty.

The state of the monasteries having long been a public scandal, Cromwell (1535) sent a commission to examine them. Acting on the reports of the commission, parliament abolished the smaller monasteries, which happened to be at once the weakest and the worst (27 Hen. VIII. c. 28). The disbanded monks made a large addition, both directly and indirectly, to the ranks of the disaffected; and to create further discontent, the swarms of vagabonds who had subsisted on the monastic alms were suddenly thrown for support on the yeomen.

The disaffection burst out in the rebellion knows as the Pilgrimage of Grace (1536). Crowds who had collected in Lincolnshire with hardly a definite aim, dispersed on a promise of redress in a parliament to be held at York. Redress, however, came not, and the crowds again gathered, this time under more skillful leaders, and with more definite purposes. The king's forces sent against them were insufficient. The whole north of England was in the hands of the rebels. Their grievances were a strange medley.

Complaints of the law regarding the tenure of land were mixed with complaints that low-born men (such as Cromwell) advised the king, that the monasteries were being dissolved, and that the old faith was being altered. Henry, through certain commissioners, again negotiated with the insurgents, and terms were agreed on, the most important of which was a general amnesty, the benefit of which, however, Aske and the other leaders did not receive. The suppression of this rebellion was followed by the dissolution (1537) of the larger monasteries (31 Hen. VIII. c. 13).

In the midst of these civil commotions, two events took place, both bearing on the Reformation, but of very different import. An order in council (1537) appointed the English translation of the Bible to be placed in every church, that all might read it. But as if to correct the idea that everyone was thus to have the right of judging for himself in religious questions, an act of uniformity was passed. Henry having now broken with many old professions, reduced his new professions to a creed, to be enforced by penalties, if more rational means should fail to commend it to the nation. Certain articles of religion were drawn up, and after some modifications were framed into those known as the 'bloody six articles.' The statute (31 Hen. VIII. c. 14) containing these articles—named with much simplicity 'An act for abolishing diversity of Opinions'—is very brief, but very formidable. The doctrines were substantially those of the Rom. Cath. Church. The articles made no pretensions to form a complete or systematic creed; they embodied the points as to which most conflict of opinion prevailed; and formidable, indeed, were the sanctions enforcing them. Whoever denied the first article (that embodying the doctrine of transubstantiation) was to be declared a heretic, and burned without opportunity of abjuration; whoso spoke against the other five articles should for the first offense forfeit his property; and whosoever refused to abjure his first offense, or committed a second, was to die like a felon. To this act Cromwell himself fell a victim. He had been silent in face of the combination which carried it; but having secretly used all his influence as a member of government to thwart its execution, by staying proceedings and giving pardons, he lost Henry's confidence, and was put to death.

The last years of the reign of Henry were disturbed with small wars with Scotland and France, inimical to progress. He died unhonored, unmourned; yet few rejoiced, for his policy had left England so divided at home, so friendless abroad, that no man could look with confidence to the future.

The character of Henry has of late been discussed at greater length than the subject deserved. The mere recital of the occurrences of his private life is sufficient to justify most of the infamy which tradition has attached to his name. The divorce of Catharine and the marriage of Anne Boleyn (q.v.) have already been told. Within a short time after the birth of the Princess (afterward Queen) Elizabeth,

Henry's affection for Anne ceased. He suspected her—not, it must be admitted, without ground—of adultery, and, after a hurried trial, had her condemned and beheaded (1536). On the day after the execution, he married Jane Seymour, against whom nothing more is known than that she was the king's partner in this revolting proceeding. Jane Seymour died (1537) in giving birth to Edward VI. The story of Anne of Cleves follows. The marriage, a political one, arranged by Cromwell to connect Henry with the German Protestants, was unfortunate from the beginning. Henry was deceived as to her personal attractions, and (1540) obtained a divorce to free himself. His fifth wife, Catharine Howard, was (1541) within a few months divorced and beheaded for an adultery well-enough established. His sixth wife Catharine Parr, survived him, and so the catalogue ends. Passing from the domestic circle to that of his immediate associates, Henry is found as incapable of friendship as he was either of feeling or of evoking love. He had three great ministers—Wolsey, More, and Cromwell—all men of high talent and worth, all on terms of closest intimacy with the king, yet all in the hour of need thrown aside. Disease and a broken spirit saved Wolsey from a worse fate; but it is little wonder that every Rom. Catholic should detest the memory of him who sent More to the scaffold for adhering to opinions which he himself had held shortly before, or that Protestants should execrate the memory of the man who violated justice and consistency to put to death the first great Protestant minister. If such were the mercies that Henry vouchsafed to those who were with him, it may be easily imagined how he dealt with those who were against him. Claims of political necessity cannot excuse the cruelty with which he persecuted every relative of Cardinal Pole, from the aged Countess of Salisbury to inferior victims. It may, however, be safely admitted, that tradition has exaggerated Henry's cruelties—that there is no truth, for example, in the tale which gives 73,000 as the number of executions in his reign; and it may be further admitted that he did not wantonly commit murders—that he had always before him in his crimes some object, either of misconceived justice, or of policy; but after allowing for everything, enough remains to explain the universal detestation in which Protestant and Rom. Catholic have combined to hold his name. He was naturally sensuous, strongwilled, and fickle; and when the easy gayety of his youth departed, the baser elements of his character manifested themselves in unrestricted force. His reign stands in history as an era in which great reforms were introduced in England; but it is not evident that these were to be credited to the king's sagacity, still less to his religious principle.

HENRY I., King of France: 1005–60 (reigned 1031–60); son of King Robert and of Constance of Aquitaine, and grandson of Hugh Capet. He was associated with his father in the govt. for 4 years before his accession; and when he came to the throne he found a formidable rebel-

lion of the chief feudal nobles that had been fomented by the mother, who had hoped for the succession of her youngest son Robert. Constance allied herself with the rebellious nobles, and Henry was forced to seek a refuge at the court of Duke Robert II. ('the Devil') of Normandy. With the assistance of the duke Henry conquered the rebellion, and on the death of his mother, 1032, gained the good will of his brother Robert by giving him the duchy of Burgundy. After the death of Robert of Normandy Henry made a league with the Count of Anjou and invaded Normandy, and on the defeat of his brother Eudes at Mortemer hastily withdrew his own army from the field; and acknowledging his failure to weaken the Normans, made a treaty of peace. His eldest son Philip was crowned as joint-king 1059.

HENRY II., King of France: 1519–59, July 10 (reigned 1547–59). He succeeded his father, Francis I. He married Catharine de' Medici 1533. The money which his father left was rapidly squandered among his favorites and mistresses. A revolt in Guienne, where the people had risen against the *gabeleurs*, or collectors of the salt-duty, was the first event that roused the king and court from their slothful ease. This disturbance was, however, speedily put down by Montmorency. Through the influence of the Guises, whose sister, the dowager-queen of James V., sought the aid of France to support her against the ambitious designs of the English government, a French alliance was cemented with Scotland, and war declared against England, which began 1550 with the recovery of Boulogne, and ended 1558 with the taking of Calais, after that city had been 210 years in the hands of the English. While the king tried to put down heresy with fire and sword at home, he strangely made treaties of alliance with the German reformers, and sent an army of 38,000 men to aid Maurice of Saxony against the emperor; and taking the command in person, made himself master of Toul and Verdun, while Montmorency, through the treachery of the garrison, seized upon Metz. After the abdication of Charles V. (1556), and the division of his vast empire between his brother Ferdinand and his son Philip II., Henry seized the opportune occasion of attacking the Netherlands and Italy before Philip II. had time to consolidate his newly acquired powers, but the results of this step were disastrous to France at every point. In Italy, the attack on Naples, made by Guise at the head of 20,000 men, utterly failed through the pusillanimity of the pope, and the energetic advance of Alva; while in the Low Countries, the French under Montmorency sustained a total defeat, 1557, at St. Quentin, where the flower of the French chivalry were either slain or taken captive by the troops of Philip, commanded by Philibert-Emmanuel, Duke of Savoy. These reverses were followed by the treaty of Château-Cambresis (1559), in which Henry agreed, in exchange for the restoration of Ham, St. Quentin, and Castelet, and the liberation of Montmorency,

to resign nearly all his conquests in the Low Countries, Piedmont, and Southern Italy. including 190 fortresses and strongholds. Shortly afterward he was mortally wounded by accident in a tournament by Count Montgomery, Scottish nobleman, captain of his guard.

HENRY III., King of France: 1551–1589, Aug. 2 (reigned 1574–89); third son of Henry II. and of Catharine de' Medici He succeeded his brother Charles IX. 1574. On the death of the Constable Montmorency, he received the chief command of the army, and his first campaign, fought in his 16th year, was signalized by two decisive victories over the Protestants at Jarnac and Moncontour. In 1573, the intrigues of the queen-regent secured to him the election to the vacant throne of Poland. He failed, however, to secure the attachment of the Polish nobles; and on receiving tidings of his brother's death, he fled by night from Cracow, and on his return to France was proclaimed king of that country. His mother and the Guises had little difficulty in persuading him to continue the religious civil war. The union of the Protestants with the party of discontented nobles, headed by the king's brother, the Duke d'Alençon, compelled the alarmed sovereign to grant the former the free exercise of their religion, and various other rights. This exasperated the Rom. Cath. party, who, headed by Henry of Guise, formed the confederation known as the *Sainte Ligue*, the object of which was not merely to assert the undivided supremacy of Rom. Catholicism, but also to secure the reversion of the throne to Guise, and civil war again and again burst out with renewed violence.

Henry availed himself of his intervals of quiet to indulge his own vicious propensities; and while his mother ruled the state, and the Guises were undermining his throne, his days and nights were spent in an alternation of dissolute excesses, and the wildest outbreaks of fanaticism. One day he might be seen passing, to the sound of music, through the streets of Paris, accompanied by a band of young men as effeminate as himself, known as the Mignons, and surrounded by parrots, monkeys, and pet dogs, while the next day he and his companions would show themselves clad in a penitent's dress, wearing masks, and carrying in their hands scourges, with which they flagellated one another as they sang aloud penitential psalms.

The assassination of the Duke of Guise 1588 finally aroused the hatred of the nation. The doctors of the Sorbonne declared the people to be relieved of the duty of obedience to the king, and the Leaguers dissolved the parliament. Henry, who was now, for the first time, thrown on his own resources—his mother had just died—was distracted by the difficulties of his position; and in his perplexity at hearing that Guise's brother, the Duke of Mayenne, had been declared lieut.gen. of the kingdom, threw himself under the protection of Henry of Navarre. The newly reconciled kings advanced at the head of 40,000 Huguenots on Paris, which, though gallantly

defended by Mayenne, would probably have had to capitulate, had not the current of events been suddenly checked through the agency of a fanatical young dominican-brother, named Jacques Clement, who on pretense of having important tidings to communicate to Henry, killed him by plunging a knife into his body. The murderer was slain on the spot by the royal guard, and his victim died the following day, after having declared his kinsman, Henry Bourbon, of Navarre, his successor.

HENRY IV. (surnamed 'The Great,' and 'The Good'), King of France and Navarre: 1553–1610, May 14 (reigned, France, 1589–1610); b. Bearn; third son of Antoine de Bourbon, and of Jeanne d'Albret, daughter and heiress of Henry, King of Navarre and Bearn. His father's death placed him under the sole control of his mother and grandfather, at whose court he was trained to the practice of knightly and athletic exercises, and inured to the active habits and rude fare common to the Bernais mountaineers. His mother, a zealous Calvinist, was careful to select learned men holding her own tenets for his instructors; and having discovered that a plot was brewing to remove him to Spain by force, to train him in the Rom. Cath. faith, she conducted him, 1569, to La Rochelle, and presented him to the assembled Huguenot army, with whom he participated in the battle of Jarnac. Henry was now chosen chief of the Protestant party, though, on account of his youth, the principal command was vested in Coligny (q.v.). Notwithstanding the defeats which the Huguenots had experienced in this campaign, the peace of St. Germain which followed was apparently most advantageous to their cause, and was speedily followed by a contract of marriage between Henry and Margaret of Valois, the sister of Charles IX. After much opposition on the part both of Rom. Catholics and of Protestants, the marriage was celebrated with great pomp 1572, two months after the sudden death of tht queen Jeanne, which was probably due to poison, and within less than a week of the massacre of St. Bartholomew. It had been originally intended that Henry was to share the fate of his friends and co-religionists but his life was spared on condition of his professing himself a Rom. Catholic. Three years Henry remained at the French court virtually a prisoner; but at length, 1576, he contrived to elude the vigilance of the queen-mother, and escaped to the camp of the Huguenots in Alençon, where, having revoked his compulsory conversion, he resumed the command of the army, and, by his skill, gained several signal advantages, which constrained the king to consent to a peace highly favorable to the cause of the reformers. The death of the Duke of Anjou (late Alençon) gave Henry the rank as first prince of the blood-royal, of presumptive heir to the crown, while the murder of Henry III., 1589, made him, in right of the Salic law, and as the nearest lineal male descendant of the royal house of France, rightful king of France. As a Protestant, under the ban of papal excommunication, he was obnoxious to the greater

part of the nation; and finding that the Dukes of Lorraine and Savoy, and Philip II. of Spain, were prepared, each on his own account, to dispute his claims, he retired to the south until he could collect more troops and obtain reinforcements from England and Germany. His nearly hopeless cause, however, gradually gained strength through the weakness and internal dissensions of the Liguists, who, in their anxiety to circumvent the ambitious designs which Philip II. cherished in favor of his daughter (niece of Henry III.), notwithstanding her exclusion by the Salic law, proclaimed the aged Cardinal Bourbon king, with the Duke of Mayenne lieut.gen. of the kingdom, and thus still further complicated the interests of their party. In 1590, Henry won a splendid victory over Mayenne at Ivry. In 1593, the assembly of the states-general, by rejecting the pretensions of Philip II., and insisting on the integrity of the Salic law, smoothed Henry's way to the succession, though it is probable that he would never have been generally acknowledged had he not, by the advice of his friend and minister De Rosny, afterwards Duke de Sully (q.v.), formally professed himself a member of the Catholic church. The ceremony of his recantation of Protestantism, which was celebrated with great pomp at St. Denis 1593, July, filled the Rom. Catholics with joy, and was followed by the speedy surrender of the most important cities of the kingdom, including even Paris, which opened its gates to him 1594: the civil war was not, however, wholly put down till four years later. In the same year, 1598, peace was concluded between Spain and France by the treaty of Vervins, which restored to France many important places in Picardy, and was otherwise favorable to the French king; but important as was this event, it was preceded by a still more memorable act, for Henry had signed an edict at Nantes, Apr. 15, by which he secured to Protestants perfect liberty of conscience and the administration of impartial justice Henry was now at liberty to direct his attention to the internal improvements of the kingdom, which had been thoroughly disorganized through long civil war. The narrow-minded policy that had been followed during the preceding reigns had left the provinces remote from the capital very much at the mercy of the civic governors and large landed proprietors, who, in the absence of a general administrative vigilance, arrogated almost sovereign power to themselves, raising taxes and exacting compulsory services. These abuses Henry completely stopped, and by making canals and roads, and thus opening all parts of his kingdom to traffic and commerce, he established new sources of wealth and prosperity for all classes of his subjects. The mainspring of these improvements was, however, the reorganization of the finances under Sully, who, in the course of 10 years, reduced the national debt from 330 millions to 50 millions of livres, though arrears of taxes to the amount of 20 millions were remitted by the king during that period. 1610, May 14, the day after the coronation of his second wife, Mary de' Medici, and when

about to set out to commence war in Germany, Henry was assassinated by a fanatic named Ravaillac. Nineteen previous attempts had been made on his life, most of which had been traced to the agency of the papal and imperial courts; hence the people, in their grief and consternation, laid Ravaillac's crime to the charge of the same influences. The grief of the Parisians was well-nigh delirious, and in their fury they wreaked the most horrible vengeance on the murderer, who, however had been a mere tool in the hands of the Jesuits, Henry's implacable foes, notwithstanding the many concessions which he had made to their order.

Time has strengthened the high estimate which the lower classes had formed of their favorite king, for though his faults were numerous, they were surpassed by his great qualities. Inordinate love of women was his worst fault, and the cause of much evil in his own and succeeding reigns; for his prodigality and weak indulgence to his favorite mistresses, Gabrielle d'Estrées and Henrietta d'Entragues, and his affection for the natural children which they bore him, were a scandal to the nation and a source of impoverishing embarrassment to the government. As authorities in regard to Henry II., III., and IV., in addition to the general histories of France, the following works may be consulted: Anquetil, *Esprit de la Ligue:* Petitot's *Collection of Mémoires;* De la Saussaye, *Histoire de Blois; Documents de l'Hist. de France;* Matthieu, *Hist. de Henri IV.;* Memoirs and Letters of De Thou, D'Aubigné, Pasquier, Duplessis-Mornay; Capefigue, *Hist. de la Réforme et de la Ligue;* Péréfixe, *Hist. de Henri IV.*

HENRY III., Emperor of Germany: 1017–56 (Holy Roman Emperor 1039–56); of the Salo-Franconian line, son and successor of Emperor Conrad II. He was elected king of the Germans, 1026, Duke of Bavaria, 1027, Duke of Swabia and Burgundy, 1037. Henry, whose good natural abilities had been cultivated as far as the age permitted, was one of the most energetic and efficient rulers of Germany. By his vigor he maintained his ascendency notwithstanding the encroachments of the church and the subordination of the princes of the empire. Having summoned a council at Sutri, 1046, he availed himself of the influence which he had acquired in Italy, by his judicious reconciliation of antagonist parties, to secure the recognition of a new pope, Clement II., and thus brought to an end the scandalous dissensions which were disturbing Christendom, through the intrigues of three rival popes, Benedict IX., Sylvester III., and Gregory IV. By his energetic maintenance of the integrity of the empire, he gained opportunities of adding new territories to the imperial states; for having retaliated on the Duke of Bohemia for the hostilities which he had carried on against the Poles during the intestine disorders of Poland, his decisive successes compelled the Bohemian duke to acknowledge himself vassal of the empire; while Henry's campaign against Hungary had a similar result, terminating, 1047, in the recognition of

the supreme power of the emperor over the kings of Hungary. He secured also powerful vassals in Italy, in the Norman conquerors of Apulia and Calabria. Henry devoted his short intervals of peace to the eradication of numerous abuses in the church, but his schemes of ecclesastical reform were secretly frustrated by Hildebrand afterward Gregory VII. (q.v.); and on the sudden death of Henry, who is supposed to have been poisoned, the papal, chair was found to have already entered on decisive measures for its emancipation from imperial influence. Henry distinguished himself as a zealous promoter of learning and the arts, especially music. He also founded numerous monastic schools, over which he placed learned monks of Brittany, and built several churches, and the cathedrals of Worms, Mayence, and Spires, in the last of which he was interred.

HENRY IV., Emperor of Germany: 1050–1106, Aug. 7 (Holy Roman Emperor, 1084–1106); son and successor of Henry III. He was elected king of the Germans, 1054, during the lifetime of his father. As he was only five years old at the death of his father, the regency was, in accordance with the wishes of the latter, confided to the child's mother, Agnes of Poitiers. Henry's perpetual quarrels with the Saxon princes and peers occupied his best years, and were the principal cause of the subsequent troubles and mortifications which have given memorable interest to his history. Unhappily for him, he was induced, 1074, after having suffered defeat and various insults at the hands of his Saxon vassals, to appeal to the pope for his intervention, and Gregory VII., who was only too happy to have an opportunity of interfering in the matter, dispatched pleni-potentiaries to settle the differences in Saxony, and availing himself of the occasion to prosecute his own plans, commanded the king to abstain from the sale and granting of benefices while the quarrel, was pending. Before these directions reached Germany, Henry had, however, settled his own affairs by defeating the Saxon insurgents in a great battle at Hohenburg, taken their princes captive, and rebuilt all the strongholds which they had dismantled; while his councilors had prosecuted a vigorous business in the interdicted sale of benefices. Henry not only approved their conduct, but responded to the pope's remonstrances on the subject, and his summons for his appearance at Rome, by declaring, through an assembly of German bishops and abbots, at Worms, 1076, that the pontiff was deposed. Gregory VII. retaliated by excommunicating and deposing Henry, and absolving his subjects from all future obedience toward him. The king at first made light of the sentence, but when he found his vassals and princes gradually falling away from their allegiance, while the electors held a diet in which they declared that unless the ban were removed within a twelvemonth, they would deprive him of the crown, he submitted; and accompanied only by his faithful consort and their eldest son, he hastened, under griev-

cus difficulties, in midwinter, to Italy, where he sought the pope. For three days, 1077, Jan., Henry, barefooted, and clothed only in the haircloth shirt of a penitent, was compelled to stand without the castle gates of Canossa, exposed to the inclemency of the weather, before the pontiff consented to remove the ban of excommunication. This incident marks the highest historic point of papal authority.

After this event, Henry's courage and resentment speedily revived; and having found adherents among the Lombards, he began a conflict against the papal power, chiefly in regard to the right of investiture, in which he was generally successful. Gregory again excommunicated Henry, who, as usual, retaliated by electing a new pope, Clement III. Hastening over the Alps, he laid siege to Rome and captured the city. Gregory took refuge in the castle of San Angelo, and Henry caused himself to be crowned emperor by the anti-pope; but finding that Hermann of Luxemburg had, during his absence, been elected king of Germany, he hastily left Rome to regain his lost power. For the third time Henry crossed the Alps, 1090, and he had already succeeded in raising the fortunes of his friend, Clement III., taken Mantua, and gained many victories over the Guelphic princes and their favorite pope, Urban II., when he suddenly learned that his son Conrad had joined his enemies, and been crowned king at Monza. Henry's despair on hearing of these acts of rebellion nearly unsettled his reason, and having retired to one of his Lombard castles, he remained several years in seclusion; but at length rousing himself from his lethargy, he returned, 1096, to Germany, where the princes and people now vied with one another to show him their sympathy and goodwill. By his own request, his second son, Henry, was elected king of the Germans, and his successor in the empire. This prince, however, having been induced by Pope Paschal II. to rise against his father, took him prisoner, and forcibly compelled him to abdicate. The emperor escaped from his prison, and found friends and safety at Liege, where he died while preparing another army to continue the struggle.

HENRY V., Emperor of Germany: 1081–1125 (Holy Roman Emperor 1110–25): son of Henry IV. His elder brother, Conrad, having been induced by the papal party to join the rebellion against his father, was declared at Mainz to have forfeited his rights to the throne by a diet, and Henry was proclaimed the emperor's successor 1098. In 1104 Henry also rebelled against his father, and the papal party treated him with extreme consideration, expecting to effect an easy reconciliation between the church and state on his accession. Henry succeeded his father 1106, and when Pope Paschal II. demanded that he should surrender the right of investing the bishops with ring and staff (see INVESTITURE), he unexpectedly refused, and four years afterward invaded Italy at the head of a large army. The pope, alarmed at the display of force, with-

drew his demand, and agreed to crown the emperor; but the Roman prelates rendered it impossible for the pope to do so, whereupon Henry made the pope and all his cardinals prisoners. Paschal then recognized the emperor's right of investiture and gave him the imperial crown. Henry had scarcely recrossed the Alps when Paschal denounced the treaty as having been obtained by force, reaffirmed his demands, and contrary to the treaty excommunicated Henry. During the next 5 years Henry was wholly occupied with the rebellions of various north German and Saxon princes; but 1116 he led a second expedition against Rome, drove Paschal from the city, and on the death of that pope caused Gregory VIII. to be chosen his successor. In opposition, the extreme papal party chose Gelasius II. as pope, who at once renewed the sentence of excommunication against Henry. The emperor returned to Germany 1119, and the same year Gelasius died; and Calixtus II., his successor, offered Henry the compromise which resulted in the concordat of Worms 1122, by which Henry surrendered the right of investiture and received others from the papal party.

HENRY VI., the Cruel, emperor of Germany: b. 1165; d. Messina, 1197, Sep. 28. He was the son of Frederick I. (Barbarossa), was crowned king in 1169, and succeeded his father as emperor in 1190. He was involved in wars in Italy to assure his possessions there. It was during his reign that Richard Cœur de Lion, returning from Palestine, was imprisoned by Leopold of Austria and surrendered to the emperor, who exacted a heavy ransom.

HENRY VII., of Luxemburg, emperor of Germany; b. 1269; d. Buonconvento, Italy, 1313, Aug. 24. He was son of the Count Luxemburg, and was chosen king of the Romans, 1308, Nov. 27, and crowned at Aix-la-Chapelle, 1309, Jan. 6. In 1311 he received the iron crown of the Lombards, and 1312, June 29, was crowned emperor at the Lateran. His march into Italy at the head of a Ghibelline army (1310, October) was hailed by Dante, who did homage at some time and place unknown. His sudden death immediately after reception of the Eucharist led to the unfounded rumor that he had been poisoned.

HENRY, Prince of Prussia: a German naval officer; brother of Emperor William; b. in Berlin, 1862, Aug. 14; entered the navy in 1877; was appointed to succeed Vice-Admiral von Diederichs in command of the German fleet in Chinese waters, 1899, March. Early in 1902, January, Emperor William requested President Roosevelt's permission for his daughter, Alice, to christen the new yacht of the Emperor, which was built in the United States. Prince Henry represented the Emperor on this occasion and with the *Hohenzollern* arrived in N. Y., Feb. 23. He was given a State dinner by President Roosevelt on the 24th; witnessed the launching of the yacht the following day; and after making a rapid tour of the country, sailed for home March 11.

HENRY, Alexander, American traveler: b. New Brunswick, N. J., 1739; d. 1824. He joined the Canadian expedition under Amherst against the French (1760) and when peace followed he went to Michilimackinac and engaged in the fur trade. After the massacre of the English by the Indians in that place he being one of the few survivors, remained a captive among the Ojibways at Sault Ste. Marie for 12 months, when he escaped and resumed the fur trade. In the pursuit of this business he traveled between Montreal and the Rocky Mountains. He also interested himself in the copper mines on Lake Superior and for many years made an effort to establish a company for their exploitation.

HENRY, Edward Lamson, American painter: b. Charleston, N. C., 1841, Jan. 12. He began his artistic studies at the Philadelphia Academy and in 1860 went to Paris where he studied for three years under Saisse and Courbet. In 1869 he was elected a member of the National Academy. He has frequently revisited Europe for the purpose of sketching the scenery, although his specialty is domestic genre, and history. In the Corcoran Gallery at Washington is one of his most characteristic pictures which shows his careful grouping of figures, his attention to detail as well as the stiffness of his drawing and his deficiency in the sense of color which recalls Wilkie, whose swing and movement he lacks, though he exhibits some of the humor of the Scottish master. The picture referred to is a crowded canvas of fifty figures with the title *Initial Excursion of the First Railway Ever Constructed in New York State.* Among his historical pictures the best are *Battle of Germantown*, owned by William Astor, *Declaration of Independence*, owned by J. W. Drexel, and *Reception to Lafayette.*

HENRY, Fort. See Donelson, Fort.

HENRY, Guy Vernon, American soldier: b. Fort Smith, Indian Territory, 1839; d. Ponce, Porto Rico, 1899. He was graduated at West Point 1861, and went to the front in the civil war, taking part in four years of the hardest fighting, from Bull Run to Cold Harbor. At 23 he was commissioned colonel of the 40th Massachusetts volunteers. After the civil war he was transferred to the 3d Cavalry, and in 1874 was in Arizona. He continued his Indian campaign, though severely wounded on one occasion, and compelled to be invalided. He served through the outbreak of the Sioux in 1890, and was also on service at Porto Rico during the Spanish-American war, where he died of typhoid fever.

HENRY, Joseph, ll.d.: 1797, Dec. 17—1878, May 13; b. Albany, N. Y.: physicist. He received a common school and academical education; studied chemistry, anatomy, and physiology with the intention of becoming a physician; was appointed asst. engineer on the survey of a route for a state road from Lake Erie to the Hudson river 1825; and was elected prof. of mathematics and natural

philosophy in Albany Acad. 1826. In 1827 he began a series of investigations in electricity and electro-magnetism which resulted in discoveries of the highest importance, and, among other universal benefits, rendered possible the electric telegraph. He first improved existing forms of apparatus; then produced the electro-magnet proper, using soft iron and increasing the amount of magnetism by enlarging the number of coils around the polar limbs; in 1829 exhibited electro-magnets of his own construction that possessed greater sustaining power than any before known; 1830 developed the intensity-magnet; 1831 suggested the application of this magnet to telegraphic uses, and constructed and operated a line of insulated wire more than a mile long in the Albany Acad.; the same year made an electro-magnet for Yale College which sustained a weight exceeding a ton, and one for the College of New Jersey that carried 3,600 pounds, and completed the first electro-magnetic engine; and 1832 discovered the production of secondary currents in a long conductor by the induction of the primary current upon itself, and obtained an electric spark by simple magnetic induction. During 1827–32 he co-operated with Dr. Beck in formulating a system of meteorological observations for the state of N. Y. In 1832 he was elected prof. of natural philosophy in the College of New Jersey, and the duties of the office, combined with lecturing on chemistry, mineralogy, geology, astronomy, and architecture, caused an interruption in his electrical studies. In 1835 he demonstrated the possibilities of an electro-magnetic telegraph by means of a series of insulated wires extended over the college green. He remained at Princeton till 1846, when he was elected the first sec. of the Smithsonian Institution; and in spite of tempting calls elsewhere—including two to the presidency of the College of New Jersey—he occupied that office till his death. He was a member of the U. S. lighthouse board from its organization 1852, and its chairman 1871–78, president of the American Assoc. for the Advancement of Science 1849, a founder of the National Acad. of Science, and its president 1868; and member of numerous societies in the United States and Europe. He received the degree LL.D. from Union College 1829 and Harvard College 1851. A memorial of him was published by order of congress 1880.

HENRY, MATTHEW: eminent Nonconformist minister: 1662, Oct. 18—1714, June 22; b. Broad Oak Farmhouse, Flintshire, England; second son of Philip Henry, who was one of the 2,000 ministers who left the Church of England on the passing of the 'Act of Uniformity.' Having qualified himself for the ministry, he began to preach 1686, June, and 1687 was settled as pastor of a Presb. congregation at Chester, where he continued 25 years. 1712, May, he removed to a charge at Hackney, near London, having refused two previous invitations from the same congregation. He died of apoplexy, on his return from a visit to his old friends at Chester. He was twice married, and had

a large family by his second wife. His principal work is an *Exposition of the Old and New Testament*, 5 vols. folio 1710, begun 1704, Nov.; often reprinted. He lived to finish only the Acts of the Apostles. The remainder was completed by various ministers, whose names are given in some of the editions. His first publication, *A discourse concerning the Nature of Schism*, 34 pages duodecimo, appeared anonymously 1689. He was author of a biographical sketch of his father, 1696; *A Scripture Catechism*, 1702, 8vo; *Communicant's Companion*, 1704, 8vo; *Discourses against Vice and Immorality*, 1705; *A Method of Prayer*, 1710, 8vo; *Family Hymns;* numerous sermons; and some religious tracts. His miscellaneous works were republished, London, 1830, 8vo. His chief work was the *Exposition, etc.*, of little value critically, but of singular value and helpfulness for its discriminating thought, its high evangelical and devotional tone, its thoroughly practical bearing, its often startling richness and pertinence of suggestion, all set forth with a rare felicity and raciness of style. In these qualities it still holds the foremost place among biblical commentaries.

HENRY, Patrick: 1736, May 29—1736, June 6; b. Studley, Hanover co., Va.: statesman. He was a son of Col. John Henry, native of Aberdeen, Scotland, school-teacher and magistrate, and was educated chiefly by his father. His youth was unpromising. He had no taste for book-learning, and with difficulty acquired a fair knowledge of the common English branches and a little Latin. He was enthusiastic only in the sports of the forest and stream. At 18 he married, and in the next six years engaged unsuccessfully in farming, and twice failed in mercantile business. In 1760 he determined to become a lawyer, and after six weeks' hard study was licensed to practice on the condition that he should continue his legal studies for a specified period. He suddenly overcame his habitual indolence, and developing a passion for history applied himself closely to that of Greece and Rome, finding a keen delight in Livy. The first three years of his legal career were passed in comparative poverty and study with naught to encourage his ambition. Suddenly, 1763, Dec., he was engaged by the co. collector, after an experienced lawyer had declined, to defend a suit brought by a minister of the Established Church to recover his salary in tobacco. By virtue of an old statute each minister was entitled to 16,000 pounds of tobacco per annum as salary. An advance in the market price of the staple caused by a short crop, had induced the colonial legislature to commute the ministers' salaries into money at a former rate per pound. The 'parsons' cause' was a protest against this action, and one of the ministers brought suit against the co. collector as a test case. Henry undertook the defense, and in arguing the people's cause, in the court over which his father presided as judge, astonished all within range of his voice by his remarkable oratorical powers and advanced patriotism. His first plea in court resulted in a

verdict for the people, gave him wide renown, and brought him business and political honors. Early in 1765, May, the passage of the stamp-act by the British parliament was proclaimed in Virginia. A few days afterward a member of the house of burgesses resigned his seat and Henry was elected to fill his vacancy. He took his seat on the 20th and on the 29th—his 29th birthday—introduced his famous resolutions asserting the rights of the colony and declaring the stamp-act unconstitutional and subversive of American liberty. His resolutions encountered extreme opposition, but he supported them in a thrilling, defiant speech, and carried five of them, the last—reciting that 'the General Assembly of this colony have the sole right and power to lay taxes and impositions upon the inhabitants of this Colony'—having a majority of one vote. It was during this speech that he made the memorable exclamation: 'Cæsar had his Brutus, Charles I. his Cromwell, and George III.'—here he was interrupted by cries of 'Treason' from all parts of the house—'may profit by their example. If this be treason make the most of it.' The publication of his resolutions and speech led to open resistance to the stamp-act elsewhere, and attracted still wider attention to the bold young orator. He was at once recognized as leader by the early patriots of the colony, and his advice was sought by anxious men in other parts. In 1769 he was admitted to practice in the gen. court of Va., and though his legal knowledge was very limited his power as a pleader made him remarkably successful and brought him a large income. In 1773 he aided materially in securing the passage by the house of burgesses of a resolution which led to the establishment of corresponding committees among the colonies; 1774 led the movement to organize a congress of the colonies; 1774 was the first speaker of the first continental congress, and sucessfully opposed the scheme of reconciliation with England; and 1775, Mar., moved in the Virginia convention that the colony be at once put in a state of defense preparatory to war, and supported the motion with a speech ending, 'I know not what course others may take, but, as for me, give me liberty or give me death!' His prophecy that 'the next gale that sweeps from the north will bring the clash of resounding arms' was realized within a few days in the reports of the conflicts at Lexington and Concord. Lord Dunmore, the royal gov. of Virginia, fearing an immediate outbreak, removed all the gunpowder in the colony to a British ship. Henry raised a force of 700 militia, marched upon the royal quarters at Williamsburg, and by threats of arrest compelled Dunmore to pay for the powder. A convention, hastily assembled at Richmond, appointed a committee of public safety, authorized the enlistment of two regiments of militia, and commissioned Henry col. and commander of all the Virginia forces. Soon afterward congress appointed a subordinate-brig.gen., and tendered Henry a commission as col., which he declined to accept and retired from the army. He was elected a member of the

Virginia convention which assembled 1776, May; and in that body secured the passage of resolutions directing the Virginia delegates in congress to work for independence, and providing that the colony should take immediate steps to constitute itself an independent state. On the adoption of its constitution he was elected gov., and served 1776–79, 1781–86. He declined appointment as delegate to the convention that framed the federal constitution 1787, and in the state convention 1788 opposed its ratification as inconsistent with the doctrine of state sovereignty. He retired to private life 1794, and subsequently declined the offices of U. S. sec. of state, chief justice of the U. S. supreme court, U. S. minister to France, and gov. of Virginia. At the request of Washington he was a successful candidate for the Virginia senate, and prepared to oppose the resolution claiming the right of a state to resist the execution of an obnoxious act of congress, but died before taking his seat.

HENRY, Robert, D.D.: 1718, Feb. 18—1790; b. St. Ninians, Stirlingshire: Scotch clergyman and historian. He studied at the Univ. of Edinburgh; and from 1768 till his death was one of the ministers of the Established Church in that city. His *History of Great Britain on a New Plan* (vol. I. pub. 1771; vol. VI. 1793)—embracing the social aspects of successive periods, thus tracing the progress of civilization in Great Britain—was an improvement on anything that had been done before; but lacks accuracy, and consequently is of little value.

HENRY, The Deacon, or Henry of Cluny, or of Lausanne. See Henricians.

HENRY, The Lion, Duke of Saxony: most notable German prince of the 12th c.; 1129–95; son of Henry the Proud. When only ten years of age, he lost his father by poison, and for the next seven years, his mother, Gertrude, and his grandmother, Richenza, ruled his paternal dominions, while his uncle, Welf (Guelf), administered the hereditary fiefs of Bavaria. In 1146, Henry took the reins of government, and at the diet of Frankfurt, in the following year, he demanded of Emperor Conrad the restoration of the whole duchy of Bavaria, which had been wrested from his father. This was refused; and Henry at once, in concert with his uncle, had recourse to arms, but his efforts were crushed by the energetic measures of Conrad. After the death of this emperor, however, Bavaria was given up to him by his cousin, Emperor Frederick I. His possessions now extended from the North Sea and the Baltic to the shores of the Adriatic. Eastphalia and Westphalia, with Engern, and the old duchy of Saxony from the Rhine to the Elbe, acknowledged his authority. The greater part of Bavaria belonged to him as a hereditary fief, while his Italian vassals in the Guelfic dominions beyond the Alps took the oath of allegiance to him 1157. In 1166, under the direction of Hartwig, Abp. of Bremen, a league, comprising the bishops of Magdeburg, Halberstadt, and Hildesheim, and the markgrafs of Thuringia and

Brandenburg, was formed against him; but the capture of Bremen, and the storming of Oldenburg by Henry, paralyzed its designs. About this time he separated from his first wife, and married Matilda, daughter of Henry II. of England, soon after which event he undertook an expedition to Palestine. During his absence, his enemies were not idle, and even Emperor Frederick showed a decided lack of good faith, which Henry, some time after his return, showed he had not forgotten, by quitting the imperial army during an Italian campaign, and thereby causing Frederick to lose the battle of Legnano, and forcing him to conclude a disadvantageous treaty. The emperor was indignant, and at the diet of Spires, 1178, spoke strongly against the duke. The numerous enemies of the latter again combined against him; he was summoned to appear at three different diets, and refusing, was put under the ban of the empire. By 1182 his fortunes were at so low an ebb, that he was forced to ask mercy of the emperor at Erfurt; but all that he could get was permission to retain his hereditary territories of Brunswick and Luneburg, and even this was on the condition of his going into exile for three years. Henry, in consequence, betook himself with his family to England, but returned to Brunswick 1184 where he lived quietly. On the departure of Frederick to Palestine 1188, Henry was again compelled to withdraw to England, but returned 1189, and after a year's fighting, a peace was concluded between him and his enemies, by which a portion of his former territories was restored to him. He died at Brunswick. Henry was a brave and generous prince, of indefatigable activity, but obstinate and passionate. He was superior to the princes of his time in his efforts to advance the commerce, industry, and comfort of his people, and to foster literature and science. Compare Böttiger's *Heinrich der Löwe Herzog der Sachsen und Baeirn* (Hannov. 1819).

HENRY, The Navigator, Portuguese prince: 1394–1463; b. Oporto; fourth son of John I., King of Portugal. He distinguished himself first at the conquest of Ceuta, 1415. After the death of his father, he took up his residence at Sagres, in Algarve, not far from Cape St. Vincent; and while prosecuting the war against the Moors of Africa, his sailors reached parts of the ocean which the navigators of the time had long supposed inaccessible. The grand ambition of Henry was the discovery of unknown regions of the world. At Sagres he erected an observatory, to which he attached a school for the instruction of youthful scions of the nobility in the sciences necessary to navigation. Subsequently, he dispatched some of his pupils on voyages of discovery, which resulted at last in the discovery of the Madeira Islands 1418. Henry's thoughts were now directed toward the auriferous coasts of Guinea, of which he had heard from the Moors; and 1433, one of his mariners sailed round Cape Nun, until then regarded as the farthest point of the earth, and took possession of the coasts as far south as Cape Bojador. Next year, Henry sent out a larger ship

which reached a point 120 m beyond Cape Bojador; and at last, 1440, Cape Blanco was reached. Henry had borne all the expense of these voyages himself; at this time self-supporting societies were formed under his guidance and what had formerly been the affair of a single individual, now became the passion of a whole nation. But Henry did not slack personally in his efforts. In 1446, his captain, Nuno Tristan, doubled Cape Verd in Senegambia, and 1448, Gonzalez Vallo discovered three of the Azores. Henry, before he died had the satisfaction of learning that his mariners had reached as far s. as Sierra Leone. See Wappäus, *Untersuchungen über die Geogr. Entdeckungen der Portugiesen unter Heinrich, dem Seefahrer* (Gött. 1842). See also Barros and Candido Lusitano; Major's *Life of Prince Henry of Portugal* (Lond. 1868); and the same author's *Discoveries of Prince Henry the Navigator* (1877).

HENRY, William, F.R.S.: 1775, Dec. 12—1836, Sep. 2; b. Manchester, England: eminent chemist. After studying medicine in the Manchester Infirmary, Henry attended the lectures of Black, Gregory, etc., in Edinburgh, 1795–6. For several years he superintended a chemical business, established by his father. He returned to Edinburgh 1805, received the degree doctor of medicine from that univ. 1807, and applied himself to the allied subjects of chemistry and medicine. He was the author of nine papers in the *Philosophical Transactions* (chiefly on the chemistry of the gases); and his *Elements of Experimental Chemistry*, 2 vols. 1799, reached an 11th ed. 1929, an almost unparalleled success for a purely scientific work. Henry, like Dr. Wollaston, made the results of science, obtained by original and difficult researches, the foundation of a splendid fortune, and few persons have contributed more effectually by the application of their discoveries to the promotion of the arts and manufactures. The Memoirs of the Manchester Soc. are indebted chiefly to him and to Dalton for their high scientific character.

HENRY, William Arnon, American educator: b. Norwalk, Ohio, 1850, June 16. He obtained his early education in the Holbrook Normal School at Lebanon, Ohio; studied at Ohio Wesleyan University from 1867-9, and at Cornell University from 1876–80, receiving the degree of B. S. Agr. He was appointed professor of botany and agriculture in the University of Wisconsin in 1881, professor of agriculture in 1883, director of the agricultural experiment station in 1887, and since 1891 has been dean of College of Agriculture in that university. He has had charge, from the beginning, of the agricultural college and experimental station of the University of Wisconsin, which now has buildings valued at $300,000 and 450 pupils. He has written; *Rush's Special Report on Diseases of Cattle and Cattle Feeding* (Part II. 1892); *Handbook on Northern Wisconsin* (1895); *Feeds and Feeding* (1898); etc.

HENRY, William Wirt, American historian and lawyer: b. Red Hill, Va., 1831, Feb. 14; d. 1900, Dec. 5.

He was educated at the University of Virginia, and took up the practice of law, later being elected to the legislature for four terms. He preferred, however, historical research to his law practice, and spent much of his time in that pursuit. He was president of the American Hist. Asso. and of the Virginia Hist. Soc. He is chiefly noted for his *Life, Correspondence, and Speeches of Patrick Henry* (3 vols. 1890–1).

HENRYSON, *hĕn'rĭ-son*, ROBERT: 1425–1506; b. Scotland: poet. Nothing is definitely known of his birth, parentage, education, or death, and but little of his career. By some he is supposed to have been an ancestor of the family of Henryson or Henderson of Fordell, by others a school-master at Dunfermline, an ecclesiastic, a Benedictine monk, a lawyer, and a notary public. In 1462 his name appeared on the list of members of the newly established Univ. of Glasgow. His writings include a metrical version of 13 of *Æsop's Fables;* the *Testament of Cresseid;* a continuation of Chaucer's *Troilus and Cresseide; Robene and Makyne*, considered the first specimen of the pastoral poetry of Scotland: *Bludy Serk*, a ballad; and the *Tale of Orpheus*. The MSS. of several of his poems are preserved in the libraries of Edinburgh and London, and a collected edition of his works was published at Edinburgh 1865.

HENSCHEL, *hĕn'shĕl*, GEORGE: baritone singer: b. Breslau, Prussia, 1850. He made his first appearance as a pianist when 12 years old, studied singing with Moscheles in the Leipsic Conservatory and afterward in Berlin, took a course in composition with Kiel, and finished his vocal education with Adolphe Schulze. He made his first appearance as a singer and composer, London 1878, and has since achieved an European and American reputation. He married a Boston lady and with her gave a series of concerts in the United States 1888–9.

HENS'LER, ELISE, or ELIZA (Countess D'Edla). See FERDINAND, AUGUSTUS FRANCIS ANTHONY.

HENSON, *hĕn'son*, JOSIAH: 1787, June 15—1881; b. Port Tobacco, Charles co., Md.: original of Harriet Beecher Stowe's 'Uncle Tom.' He was born and bred a slave, brutally treated by his overseer, sent to Ky. with all his master's slaves to escape seizure by creditors, hired out to a planter named St. Clair, whose little daughter was very kind to him; and after making a payment toward his freedom was taken by his master's son to New Orleans to be sold. With his wife and two children he escaped to Canada, settled on the site of Dresden, Ontario, became a prosperous farmer, learned to read and write when 55 years old, made lecturing tours of England, 1850, 52, and 76, was received by Queen Victoria; and was pastor of a church at Dresden many years. His relation of the incidents of his life to Mrs. Stowe formed the basis of her famous novel, *Uncle Tom's Cabin.*

HENTY, GEORGE ALFRED, English writer of novels and stories for boys: b. Trumpington, Cambridgeshire, 1832.

Dec. 8; d. Weymouth, Dorsetshire, 1902, Nov. 16. He was educated at Westminster and Cambridge, he went to the Crimea during the war with Russia, and served there in the purveyor's department of the army. Soon afterward he went to Italy to organize the hospitals of the Italian legion. As special correspondent of the *Standard* newspaper he went through the Austro-Italian, Franco-German, Turco-Servian, Abyssinian, and Ashanti campaigns, besides accompanying Garibaldi in the Tyrol. He described two of these campaigns in the works *The March to Magdala* (1868) and *The March to Coomassie* (1874). He wrote eight novels, among which are: *A Woman of the Commune* (1895); *The Queen's Cup* (1897); and *Colonel Thorndyke's Secret* (1898); but he is much more widely known as the author of a large number of stimulating stories of adventure for boys, many of them based on famous historical events. Among these are: *The Young Franc-Tireurs* (1871), a story of the Franco-German war; *The Young Buglers*, a tale of the Peninsular war (1879); *In Times of Peril*, a tale of India (1881); *Under Drake's Flag* (1882); *The Lion of the North* (1885), a story of Gustavus Adolphus; *With Lee in Virginia* (1889); *By Pike and Dyke* (1889), a story of the Dutch war of Independence; *In the Irish Brigade* (1900); and *Out with Garibaldi* (1900).

HEN'WARE. See BADDERLOCKS.

HEPAR, n. *hē'păr* [Gr. *hepar*, the liver]: various combinations of sulphur with an alkaline metal; so named by the older chemists from their brown, liver-like color; of these, *Hepar sulphuris*, mixture of tersulphide of potassium and some oxysalts of potash, is the best known.

HEPATIC, a. *hē-păt'ĭk*, or HEPAT'ICAL, a. *-ĭ-kăl* [Gr. *hepătĭkŏs*, affecting the liver—from *hepar*, the liver]: belonging to the liver—applied to a duct conveying the bile from the liver; having a liver-like color and consistency; applied to springs containing sulphuretted hydrogen in solution. HEPATICA, term in *materia medica* for medicines which affect the liver and its appendages. The hepatica may be employed (1) to modify the secretion of bile; (2) to remove pain of the liver or gall bladder, or pain and spasm of the gall-ducts; (3) to relieve enlargements and other affections of the liver. HEPATITE, n. *hē'pă-tīt*, a dark-gray variety of heavy-spar which, when rubbed or heated, emits a fetid odor like sulphuretted hydrogen. HE'PATI'TIS, n. *-tī'tĭs*, inflammation of the liver; a rare disease in temperate latitudes, but less so in the tropics where it is often acute and rapidly fatal. It is indicated by pain in the right side and shoulder, tenderness on pressure in the right hypochondrium (see ABDOMEN), with enlargement of the liver as detected by the hand and by percussion, often vomiting, always fever, with more or less loss of appetite and a foul tongue. Frequently there is jaundice (q.v.). The disease sometimes ends in abscesses, which may require to be opened externally. See LIVER, DISEASES OF. HEPATIZATION, n. *hē'păt-ĭ-zā'shŭn*, a diseased part of the

body, especially of the lungs, having the appearance of liver. HEPATIC AIR, sulphuretted hydrogen gas.

HEPATICÆ, *hē-păt'ĭ-sē*, or LIVERWORTS, *lĭv'ĕr-werts:* natural order of cryptogamous plants, included among mosses by the older botanists. They have generally a leafy stem; more rarely they are expanded into a leaf-like form. The reproductive organs are of two kinds, *antheridia* and *pistillidia*, as in mosses; the spore cases (capsules, matured pistillidia) have no operculum; open when ripe by 4–8 valves, more rarely by teeth; and generally contain with the spores, spiral filaments called *elaters*. Each elater consists of two spiral fibres, which, while the spore-case is unbroken, remain coiled up together within an oval cell; but when, by the breaking of the mature spore-case the outer pressure is removed, their elasticity bursts their cells, and as they suddenly extend themselves, they aid in the dispersion of the spores. The Hepaticæ are found in situations generally similar to those of mosses; and are widely distributed over the globe; but the greater number belong to warm climates, where they often grow on the bark, and even on the leaves of trees. Some botanists divide Hepaticæ into three orders *Jangermanniaceæ*, *Marchantiaceæ*, and *Ricciaceæ*.

HEPATO, *hē'pă-tō* [Gr. *hepar*, the liver, *hepătŏs*, of the liver]: a prefix signifying 'connected with or related to the liver.' HE'PATO-GAS'TRIC, a. *-găs'trĭk* [Gr. *gaster* the stomach]: belonging to the liver and stomach.

HEPBURN, *hĕp'bĕrn*, JAMES CURTIS, M.D.: missionary: b. Milton, Penn., 1815. He graduated at the college of N. J., 1833, and the medical dept. of the Univ of Penn. 1836; practiced about two years in Norristown, Penn.; went to China as a medical missionary 1838; spent a year in Singapore and 5 in Amoy; practiced in New York 1845–59; and went to Japan as a missionary in the latter year. Beside conducting a dispensary at Kanagawa, he has since been engaged in translating the Bible into Japanese and preparing text-books of the language. His chief work is a *Japanese-English and English-Japanese Dictionary*, in Roman, Chinese, and Japanese type (1867, 3d ed. 1886).

HEPBURN vs GRISWOLD, 1869: the great case in which the supreme court of the United States decided that the government had no power to make its own notes legal tender; reversed through a change in the constitution of the court in Knox *v.* Lee and Juilliard *v.* Greenman. Mrs. Hepburn of Kentucky had given Henry Griswold a note for 11,250 dollars, payable 1862, Feb. 20.; it was not paid when due, and five days subsequently the government passed the act authorizing $150,000,000 in notes (see GREENBACKS), receivable for public and private debts. In 1864 Griswold brought suit in the chancery court of Louisville for principal and interest; $12,270 in greenbacks was tendered in settlement, but refused, on the claim that the act did not extend to debts contracted before its pas-

sage. The court decided for Mrs. Hepburn; Griswold carried the case to the Kentucky court of appeals, which reversed the decision; Mrs. Hepburn carried it to the supreme court, which on account of the far-reaching importance of the case, and at the request of the attorney-general, laid it over till 1868, when it was reargued, and finally decided in the December term 1869. Chief Justice Chase, for five justices against three, decided that the act extended to all debts, contracted as well before as after its passage, and that the question therefore must be whether the government had the power to make anything but coin a legal tender; that it could not do so, under the constitution, because at the time of its adoption no money but gold and silver was recognized; that as paper money never rose above coin and almost always fell below it, each particle of depreciation was so much abstracted from the value understood by the parties to the contract, and was therefore an unlawful deprivation of private property; that the power of Congress to use 'necessary means' to carry out its power of making war did not convey this right, because this was no more a special means of carrying out war powers than any other powers, and would enable it to issue bills of credit and make them legal tender just as much in the post-office business or the patent business as the war. The minority admitted that it was so impairing the obligation of contracts, but asserted that Congress was given the power to do so; and this is now law.

HEPHÆSTION, *hē-fĕs'tĭ-on:* about B.C. 357–325; b. Pella, Macedonia; companion of Alexander the Great. The singular friendship between Hephæstion and the prince sprang up when both were children and continued as an intimacy without interruption till the death of Hephæstion. Hephæstion accompanied Alexander to Troy, was honored with important commands in the campaigns in Bactria and India, and was rewarded by the conqueror with a golden crown and the hand of Drypetis, daughter of Darius and sister of Alexander's wife. He died suddenly in Ecbatana, and Alexander was so overwhelmed with the news of the event that he ordered the physician who had attended Hephæstion put to death, had the sacred fire extinguished—which was done only at the death of a Persian monarch—intrusted the body of his favorite to Perdiccas, ordered a general mourning throughout Asia, honored the remains with a most magnificent funeral in Babylon, and had temples erected to Hephæstion as a public hero.

HEPHÆS'TUS. See VULCAN.

HEPTA, *hĕp'tă* [Gr. *hepta*]: a prefix signifying seven.

HEPTACHORD, n. *hĕp'tă-kawrd* [Gr. *hepta, seven*; *chŏrde*, a chord]: an anc. musical instrument of seven strings, a poetical composition played or sung on seven different notes.

HEPTAGON, n. *hĕp'tă-gŏn* [Gr. *hepta*, seven; *gōnĭă*, an angle]: plane figure of *seven* sides and *seven* angles; when

the sides and angles are equal, the figure is a *regular heptagon*. Geometers have hitherto failed to discover a method of inscribing the heptagon in, or of circumscribing it about a circle, and the problem is believed by many to be, like 'the trisection of an angle,' impossible of solution by the ancient geometry. HEPTAG'ONAL, a. *-ŏ-năl*, having seven sides and angles.

HEPTAGYNOUS, a. *hĕp-tăj'ĭ-nŭs* [Gr. *hepta*, seven; *gŭnē*, a female]: in *bot.*, having seven styles.

HEPTAHEDRON, n. *hĕp'tă-hē'drŏn* [Gr. *hepta*, seven; *hĕdră*, a seat]: a solid figure having seven bases or sides.

HEPTANDRIAN, a. *hĕp-tăn'drĭ-ăn* [Gr. *hepta*, seven; *aner*, or *andra*, a man]: in *bot.*, having seven stamens, as in the HEPTAN'DRIA, n. *-drĭ-ă;* also HEPTAN'DROUS, a. *-drŭs*.

HEPTANGULAR, a. *hĕp-tăng'gū-lĕr* [Gr. *hepta*, seven; L. *angŭlŭs*, a corner]: having seven angles.

HEPTANOMIS: Greek name for the interior of ancient Egypt, 30°—27° n., comprising the great cities and monuments.

HEPTARCHY, n. *hĕp'târ-kĭ* [Gr. *hepta*, seven; *archē*, rule]: a government by seven persons; the country so governed; England, when divided into seven kingdoms (see HEPTARCHY, THE). HEPTARCHIC, a *hĕp-târ'kĭk*, denoting a sevenfold government. HEP'TARCHIST, n. *-kĭst*, one who rules in a heptarchy.

HEPTARCHY, *hĕp'târk'ĭ*, THE: seven kingdoms said to have been established by the Saxons in England. (See ANGLO-SAXONS). The common idea is, that these seven kingdoms were contemporaneous; but all that can be safely asserted is, that England, in the time of the Saxons, was peopled by various tribes, of which the leading occupation was war; and that sometimes one was conquered, sometimes another. At no time was there a counterpoise of power among seven of them, so that they could be said to have a separate, much less an independent existence. Still, seven names do survive (some authorities adding an eighth.) The king of the one that had the fortune to be most powerful for the time being, was styled Bretwalda or ruler of Britain, but in most instances the power of this supposed ruler beyond the limits of his own territory must have been very small. Under Egbert, Wessex rose to be supreme, and virtually swallowed up the others. The following is a brief account of the seven kingdoms commonly said to have formed the Heptarchy:

1. Kent, after the battle of Creccanford, in which 4,000 Britons were slain, was abandoned by the Britons, and became the kingdom of their conquerors, a band of Jutes, who had come A.D. 446 to serve Vortigern, King of the Picts, as mercenaries, under the leadership of Hengist and Horsa, who were little other than pirates. Hengist became king of Kent, and his son Eric or Aesc succeeded him, and from him his descendants, the kings of Kent, were called Aescingas. In 796, Kent was conquered by Cenwulf, king of Mercia; and about 823 both were con-

quered by Egbert, king of Wessex, who appointed his son Ethelwulf king of Kent, which hereafter, though separate in name, was really subordinate to Wessex.

2. Sussex, partially conquered about 477, and wholly, before 491, by Ella the Saxon, who was the first bretwalda of Britain. Sussex submitted to Egbert of Wessex 828, and his son Athelstane governed it under him.

3. Wessex, though fluctuating in extent, as were all the kingdoms, included Surrey, Hants, the Isle of Wight, Berks, Wilts, Dorset, Somerset, Devon, and part of Cornwall. It was founded about 494 by Cerdic and Cynric his son, 'Ealdormen' or leaders of the 'old Saxons.' King Egbert, who returned from a flight to Gaul 800, and ruled from that year till his death 836, was, as a conqueror, the most successful of all these Saxon kings. When he died, his dominions were divided between his sons, Ethelwulf and Athelstane, the former taking Wessex Proper, and the latter Kent, Essex, Sussex, and Surrey. Another Athelstane, who succeeded 925 to Mercia and Wessex, conquered Exeter, and assumed Northumbria, exacted tribute from the Welsh, and some formal submission from the Britons of the west, as well as the Danes and Scots. He appears occasionally to have held witenagemôtes or Saxon parliaments of subordinate chiefs (*subreguli*), and at one of these, Constantine, King of Scotland, appeared as a *subregulus*. But Athelstane and his successors, as well as his predecessor, Alfred the Great, belong to the history of England, as indeed do all the Saxon states and kings after Egbert.

4. Essex, which comprised also Middlesex, if ever independent, was so about 530; but early in the 7th c. it became subject to Mercia, and fell with it to Wessex 823. This state and Sussex and Wessex were founded by the old Saxons; the remaining three by the Angles who came from Holstein and gave their name to England.

5. Northumbria consisted of Bernicia and Deira, which were at first separate and independent states. The former comprised Northumberland and all Scotland south of the Forth, and was founded by Ida about 560. The latter comprised Cumberland, Durham, York, and Lancaster, and was founded by Ella the Angle about the same date. These two were united about 655, and, as Northumbria, they submitted to Egbert 829.

6. East Anglia, comprising Norfolk, Suffolk, and Cambridge, was founded about 571 by Uffa, and from him its kings were named Uffingas. In 883, it was conquered by the Danes, and was restored to Saxon rule by Athelstane 925.

7. Mercia included the counties in the centre of the kingdom, and is said to have been founded by Crida or Creoda 585. Three-quarters of a century later, it was conquered for a time by Northumbria, but it recovered its independence, and retained it until Egbert subdued it. Canute the Dane had it and Northumbria ceded to him 1016, just before Edmund Ironside's death allowed him to

become king of England, and the Danes to obtain the accendency over the Saxons, for which they had been striving, at intervals, for five generations. Compare Palgrave's *Rise and Progress of the English Commonwealth* (2 vols. Lond. 1832).

HEPTATEUCH, n. *hĕp'ta-tūk* [Gr. *hepta*, seven; *teuchos*, a book]: the first seven books of the Old Testament.

HEPWORTH, *hĕp'worth*, GEORGE HUGHES, D.D.: Congl minister and an editor: b. Boston, 1833, Feb. 4; d. 1902, June 7. He graduated at the Cambridge Divinity School 1855, was pastor of a Unit. church in Nantucket 1855–57 and of the Church of the Unity in Boston 1858–70, chaplain of the 47th Mass. vols. in La. 1862, on Gen. Banks's staff 1863, pastor of the (Unit.) Church of the Messiah in New York 1870–72; became a Trinitarian, organized the Church of the Disciples in New York, and was its pastor 1872–79, made a foreign tour, was pastor of the Belleville Ave. Congl. Church in Newark, N. J., 1882-85, and an editor of the N. Y. *Herald*. He was author of *Whip, Sword and Hoe*, (1864); *The Little Gentlemen in Green* (1865); *Rocks and Shoals* (1870); *Lectures to Young Men* (1870); *Christ and His Church* (1872); *Starboard and Port* (1876); and *!!!* (1885).

HER. pron. *hēr* [AS. *heo*, she; *hi*, her; *hyre*, of or to her]: the objective case sing. of the fem. pers. pron. she, and also one form of the possessive, the other being HERS, *hėrz*, the poss. form. HERSELF, compound pers. pron.

HE'RA. See JUNO.

HERACLEA, *hĕr-a-klē'â*, or HERACLEIA: ancient city of Magna Græcia, on the right bank of the Aciris (modern Agri), about three m. above the mouth of that river in the Gulf of Tarentum. It was founded about B.C. 432, and, though under the Romans it became a prosperous, important, and refined city, it never acquired historical prominence. When it fell into decay, is not known, but at the present day little remains to mark its site except heaps of rubbish. In the neighborhood, besides a large number of coins, ranking among the very finest relics of antiquity, there have been discovered certain bronze tables, known as the *Tabulæ Heracleenses*, containing a copy of the *Lex Julia Municipalis* (B.C. 45). and forming one of the principal authorities for a knowledge of the municipal law of ancient Italy. This inscription has been published by Muratori, Savigny, and others.

HERACLEA, *hĕr-a-klē'â*, or HERACLEIA, *hĕr-a-klī'â:* city on the s. w. coast of Sicily, at the mouth of the Halycus river; distinguished from other ancient cities of the same name by the surname of Minoa, in honor of Minos, its supposed founder. It was subdued by Euryleon, grew in importance till destroyed by the Carthaginians, was taken by Pyrrhus and Hanno, was the scene of the defeat of the Carthaginian fleet by Regulus and Manlius, and, after being occupied by the Romans and Carthaginians alternately, resisted Marcellus a considerable time after the fall of Syracuse.

HERACLEIDÆ, *hĕr-a-klī′dē:* in the widest sense, all 'the descendants of Heracles' (Hercules), of whatever time, and in whatever district of Greece; but specially those adventurers who, founding their claims on their supposed descent from the great hero (to whom Zeus had promised a portion of the land), joined the Dorians in the conquest of the Peloponnesus. There were five different expeditions, the last and greatest occurring 80 years after the Trojan war. The leaders of this last were Temenus, Cresphontes, and Aristodemus, sons of Aristomachus. They defeated Tisamenus, son of Orestes and grandson of Agamemnon, and thus gained possession of Argos, Sparta, and Mycenæ. The other parts of the country quickly submitted to them, and they then proceeded to divide the spoil. Argos fell to Temenus; Lacedæmon to Procles and Eurystheus, sons of Aristodemus; and Messenia to Cresphontes. This story of the return of the Heraclidæ touches on the historical period, and, though there is much of fable and tradition, yet there seems also a large substratum of truth in the records. See Müller's *Dorians;* Thirwall's and Grote's *Greece.*

HERACLEON, *hē-răk′lē-on:* Gnostic philosopher: abt. A.D. 125; in s. Italy or in Sicily. The early writers mostly assign him to the Valentinian group of heretics, though he had some views peculiar to himself. See VALENTINIANS.

HER′ACLES. See HERCULES.

HERACLITUS, *hĕr-a-klī′tŭs* (or HERACLEITUS), OF EPHESUS: Greek philosopher: abt. B.C. 535—B.C. 475; b. Ephesus, in Asia Minor, of a prominent family. The result of Heraclitus's researches and meditations was a work on the nature of things, said to have been entitled *Peri Physeōs* (On Nature). Such fragments of it as remain were collected and elucidated by Schleiermacher in Wolf and Buttmann's *Museum der Alterthumswissenschaften.* Heraclitus believed the universe is undergoing constant transformation, and denied the existence of anything that does not change. In opposition to the Eleatic school (q.v.) he thus denied permanence, or Being, and affirmed that the only reality is change or Becoming. He chose fire, on account of its volatile character, as the true principle of existence. All the elements are in constant strife, and earth and water pass over by rarefaction into fire, and fire becomes condensed into water and earth and all particular things. This circuit is being endlessly performed, and 'strife is the father of all things.' This law of opposition and change is governed by reason (*lógos*) and justice (*díkē*).

Though his views are highly fantastic, and most modern scientists would agree with the ancients that he went too far in denying the existence of any permanent substratum of matter at all, yet it is a fact that modern scientific explanations are almost wholly stated in terms of motion and change. Heraclitus in poetical form has stated a theory of the world that in its main principles strikingly coincides with the belief of modern physicists. The text

and English translation of the fragments of Heraclitus are given by Arthur Fairbanks in *The First Philosophers of Greece* (Lond. 1898); translation and commentary by John Burnet. *Early Greek Philosophy* (Lond. 1892).

HERACLIUS, *hĕr-a-klī′ŭs:* Byzantine emperor: abt. 575—641 (reigned 610–641); b. in Cappadocia; descended from a line of brave ancestors. His father, also named Heraclius, was exarch or gov.gen. of Africa. Regarding Heraclius's youth, we know almost nothing; but when past 30 years of age, he took part in the conspiracy (which proved successful) against the emperor Phocas, whose horrible cruelties had made him universally detested. In 610, Heraclius, at the head of a fleet, appeared at Constantinople: the citizens rose in rebellion, Phocas was beheaded, and Heraclius, having 'usurped the usurper's throne,' was saluted emperor in his stead. His fellow conspirators were richly rewarded. The condition of the Byzantine empire at this time was deplorable. Factions within and the barbarians without had reduced it almost to ruin, so that years elapsed before Heraclius—a man of splendid but fitful genius could put forth any vigorous efforts for its reorganization. His most powerful enemies in the north were the Avari, who, 619, plundered the country to the very gates of Constantinople, nearly captured Heraclius himself, and are said to have carried with them to their homes beyond the Danube 250,000 prisoners. The whole western empire had by this time been seized by the Slaves, Lombards, Visigoths, and other tribes; but by far the most alarming conquests were those made in the East by the Persian king Choroës II. In 1615, Sarbar, the Persian general, stormed and plundered Jerusalem. The same fate befell Alexandria in the following year, after which all Egypt yielded to the victorious Sarbar, who penetrated as far as Abyssinia. By stopping the export of corn from Egypt to Constantinople, he likewise caused a severe famine in the latter city. In the same year (616), the Persians besieged and captured Chalcedon, opposite Constantinople. Heraclius at first tried to negotiate with his enemies, but, flushed with their triumphs, they refused, and even put his ambassadors to death. Probably the emperor, who was now laying his plans for taking a magnificent revenge on the Persians, was not greatly displeased at their refusal. Having, after a whole year of laborious discipline, organized an army composed of Greeks and barbarians, he, 622, shipped his troops at the Bosporus, and sailed for Cilicia. Having landed, he encamped in the plain of Issus, completely routed a Persian army despatched against him, and forced his way, through the passes of the Taurus and Anti-Taurus, into the province of Pontus, where his soldiers wintered. In 624, he crossed Armenia, conquered several of the Perso-Caucasian countries, and reached the Caspian Sea. Here he formed an alliance with the khan of the Khazars, who ruled over the sterile regions n. of the Caucasus, as far as the river Ural. By the assistance of these and other barbarians, he attacked Media, and carried his

arms as far s. as Ispahan. Before going into winter quarters, he again utterly defeated the main body of the Persians, commanded by Chosroës himself. In 625, Heraclius descended from the Caucasus into Mesopotamia, and thence proceeded into Cilicia, where a sanguinary engagement took place between him and Sarbar; the Persians were routed with immense slaughter, and Sarbar fled to Persia. During the next two years (626–628), the glory of Heraclius culminated. He carried the war into the heart of the Persian empire, and 627, Dec., cut to pieces the forces of Rhazates, the Persian general, near the junction of the Little Zab and the Tigris. An immense booty fell into the hands of the victors. A few days afterward, Heraclius took Artemita or Dastagerd, favorite residence of Chosroës, and here the Arabic historians exhaust hyperbole in attempting to state the enormous treasure which the Byzantine emperor captured. Chosroës fled into the interior of Persia, and was soon afterward seized, imprisoned, and starved to death by orders of his son and successor, Siroes, who was glad to conclude a peace with Heraclius, by which the Persians gave up all their former conquests. The fame of Heraclius now spread over the whole world, and ambassadors came to him from the remotest kingdoms of the East and West; but a new and terrible enemy suddenly arose in the South. The Arabs, filled with the ardor of a new and fierce faith, had just set out on their career of sanguinary Mohammedan proselytism. The war begun during the life of the prophet himself was continued by his successors Abubekr and Omar. Heraclius no longer commanded the Byzantine forces himself, but wasted his days in his palace at Constantinople, partly in sensual pleasures, and partly in wretched theological disputations. His mighty energies were quite relaxed; and before the close of his life, Syria, Palestine, Mesopotamia, and Egypt were in the hands of the caliphs. After military campaigns which give him rank with the greatest generals of the world, he sank into a lethargy in which he seemed careless of his empire and of all great interests. The cause may have been in the ravages of the protracted disease of which he died.

HERALD, n. *hĕr′ăld* [OF. *hérauld* and *heralt;* F. *héraut,* a herald—from mid. L. *heral′dŭs*—from O.H.G. *haren,* to shout]: an officer who reads proclamations and regulates public ceremonies, etc.; one who orders and registers all matters connected with genealogy and armorial bearings; a precursor or harbinger; one who formerly carried messages between princes: V. to proclaim; to introduce, as by a herald. HER′ALDING, imp. HER′ALDED, pp. HERALDIC, a. *hĕ-răl′dĭk,* of or relating to heralds or heraldry. HERAL′DICALLY, ad. *-dĭ-kăl-lĭ.* HERALDRY, n. *hĕr′ăl-drĭ,* the art or practice of blazoning arms or ensigns armorial, etc.; the science which teaches how to blazon or explain in proper terms all that belongs to coats of arms. HER′ALDSHIP, n. the office of a herald. *Note.*—O.H.G. *herolt;* Ger. *herold,* a herald, with which compare O.H.G. *Hariold;*

Icel. *Haraldr*, Harold—contracted from *Hariwald*—from *hari*, Ger. *heer*, an army; *wald* or *walt*, strength, thus= army-strength, a warrior, an officer.

HER'ALD: an officer whose duty consists in the regulation of armorial bearings, the marshalling of processions, and the superintendence of public ceremonies. In the middle ages, heralds were highly honored, and enjoyed important privileges; their functions included also the bearing of messages, whether of courtesy or defiance, between royal or knightly personages; the superintending and registering of trials by battle, tournaments, jousts, and all chivalric exercises; the computation of the slain after battle; and the recording of the valiant acts of the falling or surviving combatants. The office of herald is probably as old as the origin of coat-armor. The principal heraldic officers are designed kings-of-arms or kings-at-arms, and the novitiates or learners are styled pursuivants. Heralds were originally created with much ceremony; they are now appointed by the Earl Marshal in England, and by the Lyon King-of-Arms in Scotland. There are now in England three kings-of-arms, named by their offices Garter, Clarencieux, and Norroy; six heralds—Somerset, Chester, Windsor, Richmond, Lancaster, and York; and four pursuivants, Rouge Dragon, Portcullis, Blue Mantle, and Rouge Croix. There have been at different periods other heralds, whose titles are now laid aside; heralds extraordinary also have sometimes been created, as Edmonson, by the title of Mowbray, 1764. In Scotland, the principal heraldic officer is Lyon king-of-arms; and the permanent number of heralds and pursuivants in Scotland is now reduced to three of each. Ireland has one king-of-arms, Ulster; two heralds, Cork and Dublin; and two pursuivants, of whom the senior bears the title of Athlone, and the other is called the pursuivant of St. Patrick.

The official costume of a herald consists of an embroidered satin tabard or surcoat of the royal arms, and a collar of SS. See KING-AT-ARMS; PURSUIVANT; HERALDS' COLLEGE.

HER'ALDRY: properly the knowledge of all the multifarious duties devolving on a herald (see HERALD): in the more restricted sense, in which we here consider it, it is the science of armorial bearings. After occupying for ages the attention of the learned, and forming an important branch of a princely education, the study of heraldry fell, in later times, into neglect and disrepute, and was abandoned to coach-painters and undertakers, a degradation owing in part to the endless tissue of follies and mystifications that had been interwoven with it. Modern criticism has rescued heraldry from the pedantries and follies of the heralds, and imparted to it a new interest, as a valuable aid to historical investigations.

Though we have instances in remote times of nations and individuals distinguishing themselves by particular emblems or ensigns, nothing that can properly be called armorial bearings existed before the middle of the 12th c.

The shields of the French knights in the first crusade presented a plain face of polished metal; and there is no evidence of heraldic devices in use in the second crusade 1147. But the Anglo-Norman poet Wace, in the latter part of the 12th c., mentions devices or cognizances as being in use among the Normans, 'that no Norman might perish by the hand of another; nor one Frenchman kill another,' and Wace is curiously corroborated by the Bayeux tapestry of the 12th c., where there are figures of animals on the shields of the invaders, while the Saxon shields have only borders or crosses. The rude devices on these shields have nothing approaching to an armorial form or disposition, yet it is probable that systematic heraldry sprang out of them, but it is difficult to say when they assumed that hereditary character essential to the idea of armorial bearings. Some sort of armorial insignia were depicted on the shields used in the third crusade, 1189; and in the same half century originated the fleurs-de-lis of France and the lions of England. The transmission of arms from father to son seems to have been fully recognized in the 13th c., and in the practice then introduced of embroidering the family insignia on the surcoat worn over the hauberk or coat of mail, originated the expression *coat of arms*. Arms were similarly embroidered on the jupon, cyclas, and tabard, which succeeded the surcoat, a practice which survived till the time of Henry VIII., when the tabard was entirely disused except by heralds, who still wear on their tabards the royal arms.

It was by slow degrees that the usage of arms grew up into the systematized form which it assumes in the works of the established writers on heraldry. The principal existing data for tracing its progress are English rolls of arms yet extant of the times of Henry III., Edward I., and Edward III. The earliest formal treatises date no further back than the end of the 14th c., before which time the whole historical part of the subject had been obscured by a tissue of gratuitous fictions which has misled most subsequent writers till a very recent period. The professors of the science represent the heraldry of the 10th and 11th c. as equally sharply defined with that of the 15th and 16th. The arms of William the Conqueror and his sons are described with all their differences; arms are ascribed to the Saxon kings of England, to Charlemagne, and even to half-mythical persons and heroes of classical times. It is surprising to find this fictitious heraldry understood and systematized early in the 14th c. The arms traditionally considered to be those of Edward the Confessor were sculptured in Westminster Abbey in the reign of Edward II.

In the infancy of heraldry, every knight assumed what arms he pleased, without consulting sovereign or king-at-arms. Animals, plants, imaginary monsters, things artificial, and objects familiar to pilgrims, all were fixed on; and whenever it was possible, the object chosen was one whose name bore sufficient resemblance in sound to suggest the name or title of the bearer of it. There is reason to

believe that early arms were generally *armes parlantes*, though the allusion has in many cases ceased to be intelligible from the old name of the object being forgotten. The charge fixed on was used with great latitude, singly or repeated, or in any way which the bearer chose or the form of his shield suggested. But as coats of arms became more numerous, confusion often arose from different knights adopting the same symbol; and this confusion was increased by a practice which crept in of sovereigns or feudal chiefs allowing their arms, or part of them, to be borne as a mark of honor by their favorite followers in battle. Hence different coats of arms came in many instances so closely to resemble each other that it was imperative, for distinction's sake, that the fancy of the bearer should be restrained, and regulations laid down regarding the number and position of the charges, and the attitudes of the animals represented. This necessity led, in the course of time, to the systematizing of heraldry, a process which the rolls alluded to show us was going on gradually through the 13th and 14th c. By the time that heraldry was consolidated into a science, its true origin had been lost sight of, and the credulity and fertility of imagination of the heralds led them to invest the most common charges with mystical meanings, and to trace their original adoption to the desire of commemorating the adventures or achievements of the founders of the families who bore them. The legends ascribing an origin of this sort to the early armorial bearings have, in nearly all instances where it has been possible to investigate them, turned out to be fabrications. It was only when heraldry began to assume the dignity of a science that augmentations of a commemorative character were granted, one of the earliest known instances being the heart added to the coat of Douglas, in commemoration of the good Sir James's pilgrimage with the heart of King Robert. After the science became thoroughly systematized, augmentations and new coats were often granted with a reference to the supposed symbolical meanings of the charges.

In England, the assumption of arms by private persons was first restrained by a proclamation of Henry V., which prohibited every one who had not borne arms at Agincourt to assume them, except in virtue of inheritance or a grant from the crown. To enforce the observance of this rule, heralds' visitations or processions through the counties were instituted, and continued from time to time till the reign of William and Mary. See VISITATIONS, HERALDS'.

Jurisdiction in questions of arms is executed by the Heralds' College in England, the Lyon Court in Scotland, and the College of Arms in Ireland. No one within the United Kingdom is entitled to bear arms without a hereditary claim by descent, or a grant from the competent authority; and the wrongful assumption of arms is an act for which the assumer may be subjected to penalties. (See HERALDS' COLLEGE; LYON COURT). The use of arms, whether rightfully or wrongfully, subjects the bearer of them to an annual tax. It is illegal to use without authority not only

a coat of arms, but even a crest. Any figure or device placed on a heraldic wreath (see WREATH) is considered a crest in questions with the Heralds' College or Lyon Court, as well as in questions with the Commissioners of Inland Revenue. It shows how deeply the passion for outward distinction is implanted in human nature, when, in the United States, where all differences of rank are theoretically repudiated, we find many people assuming heraldic devices, each man at his own choice.

Besides individuals, communities and states are entitled to the use of arms, and heralds have classified arms, in respect of the right to bear them, under the following ten heads: (1) Arms of dominion, borne by sovereigns as annexed to their territories. (2) Arms of pretension, which sovereigns have borne, who, though not in possession, claim a right to the territories to which the arms belong: thus England bore the arms of France from the time of Edward III. till 1801. (3) Arms of community; pertaining to bishops' sees, abbeys, universities, towns, and corporations. (4) Arms of assumption, which one has a right to assume with the approbation of the sovereign: thus, it is said, the arms of a prisoner at war may be borne by his captor, and transmitted by him to his heirs. (5) Arms of patronage; added by governors of provinces, lords of the manor, patrons of benefices, etc., to their family arms, as a token of superiority, right, or jurisdiction. (6) Arms of succession, borne quartered with the family arms by those who inherit fiefs or manors, either by will, entail, or donation. Thus the Dukes of Athole, as having been lords of the Isle of Man, quarter the arms of that island, and the Duke of Argyle quarters the arms of the lordship of Lorn. (7) Arms of alliance, taken up by the issue of heiresses, to show their maternal descent. (8) Arms of adoption, borne by a stranger in blood, to fulfil the will of a testator who, being the last of his family, may adopt a stranger to bear his name and arms and possess his estate: arms of adoption can be borne only with permission of a sovereign or king-at arms. (9) Arms of concession; augmentations granted by a sovereign of part of his royal arms, as a mark of distinction, a usage which, as above observed, obtained in the earliest days of heraldry; hence the prevalence among armorial bearings of the lion, the fleur-de-lis, and the eagle, the bearings of the sovereigns of England and Scotland, of France, and of Germany. (10) Paternal or hereditary arms, transmitted by the first possessor to his descendants.

A coat of arms is composed of charges depicted on an escutcheon representing the old knightly shield. The word escutcheon is derived from the French *écusson*, which signified a shield with armorial bearings, in distinction from *écu*, a shield generally. The shields in use in England and France in the 11th and 12th c. were in shape not unlike a boy's kite, a form which seems to have been borrowed from the Sicilians; but when they became the recipients of armorial bearings, they were gradually flattened and shortened. From the time of Henry III., the escutcheon

has been most frequently represented on seals as of something approaching to a triangular form, with the point downward, the chief exceptions being that the shield of a lady is lozenge-shaped, and of a knight-banneret square. To facilitate description, the surface or field of the escutcheon has been divided into nine points (fig. 1), technically distinguished by the following names: A. the dexter chief point; B, the middle chief; C, the sinister chief; D, the honor or collar point; E, the fess point, F, the nombril or navel point; G, the dexter base point; H, the middle base; and I, the sinister base point. It will be observed that the dexter and sinister sides of the shield are so called from their position in relation, not to the eye of the spectator, but of the supposed bearer of the shield.

Fig. 1.

Coats of arms are distinguished from one another, not only by the charges or objects borne on them, but by the color of these charges, and of the field on which they are placed. The field may be of one color, or of more than one, divided by a partition line or lines varying in form. The first thing, then, to be mentioned in blazoning a shield —that is, describing it in technical language—is the color, or, as it is heraldically called, *tincture* of the field. Tinctures are either of metal, color strictly so called, or fur. The metals used in heraldry are two—gold, termed *or*, and silver, *argent*—represented in painting by yellow and white. The colors are five—red, blue, black, green, and purple, known as *gules*, *azure*, *sable*, *vert*, and *purpuer*. Metals and colors are indicated in uncolored heraldic engravings by points and hatched lines, an invention ascribed to Father Silvestro di Petrasancta, Italian herald of the 17th c. *Or* (fig. 2) is represented by points; for *argent*, the field is left plain. *Gules* is denoted by perpendicular, and *azure*, by horizontal lines; *sable*, by lines perpendicular and horizontal crossing each other; *vert*, by diagonal lines from dexter chief to sinister base; *purpure*, by diagonal lines from sinister chief to dexter base. The *furs* were originally but two, *ermine* and *vair*. The former is represented by black spots resembling those of the fur of the animal called ermine, on a white ground. *Vair*, said to have been taken from the fur of a squirrel, bluish-gray on the back, and white on the belly, is expressed by blue and white shields, or bells in horizontal rows, the bases of the white resting on the bases of the blue. If the vair is of any other colors than white and blue, they must be specified. Various modifications of these furs were afterward introduced, among others, *ermines*, or ermine with the field sable and the spots argent; *erminites*, with a red hair on each side of a black spot; *pean*, with the field sable, and the spots or; *counter-vair*, or vair with the bells of one tincture placed base to base; and *potent counter-potent*, vair with crutch-shaped figures instead of bells.

It is an established rule of heraldry that metal should

not be placed on metal, nor color on color; a rule more rigidly adhered to in English heraldry than in that of other countries. There is one remarkable transgression of it in arms of the kingdom of Jerusalem founded by the Crusaders, which are argent, a cross potent between four crosses or. A recognized exception exists wherever a charge lies over a field partly of metal and partly of color, or where an animal is (see *infra*) attired, armed, unguled, crowned, or chained with a tincture different from that of his body. Marks of cadency, chiefs, cantons, and bordures also are occasionally exempted from the general rule,

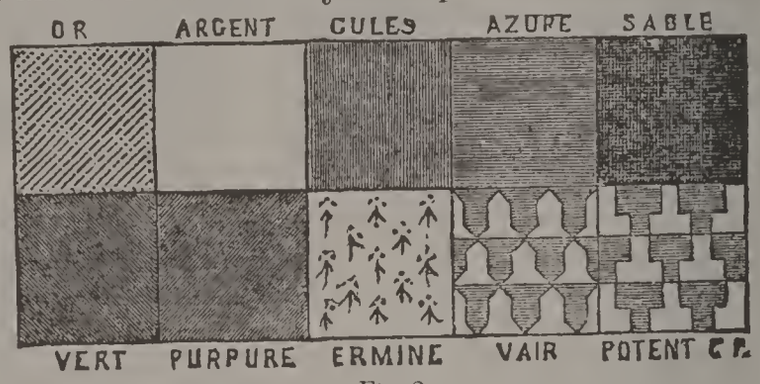


Fig. 2.

being, according to some heralds, not laid on the shield, but *cousu* or sewed to it.

Everything contained in the field of an escutcheon is called a *charge*. Charges are divided by heralds into the three classes of honorable ordinaries, sub-ordinaries, and common charges. Under the name of ordinaries or *honorable ordinaries* are included certain old and very frequent bearings, whose true peculiarity seems to be that, instead of being taken from extraneous objects, they are representations of the wooden or metal strengthenings of the ancient shields. They are ten in number: 1. The *Chief* (fig. 3), the upper part of the shield separated from the rest by a horizontal line, and comprising, according to the requirements of heralds, one-third of it, though this proportion is seldom rigidly adhered to: its diminutive is the fillet, supposed to take up one-fourth the space of a chief, in whose lowest part it stands.

2. The *Pale* (fig. 4), band or stripe from top to bottom, said, like the chief, to occupy one-third of the shield: it has two diminutives, the *Pallet*, one-half in breadth of the pale, and the *Endorse*, one-half of the pallet.

3. The *Bend* (fig. 5), similar band crossing the shield diagonally from the dexter chief to sinister base: its diminutives are the *Bendlet* or *Garter*, one-half of its breadth; the *Cost* or *Cottise*, one-half of the bendlet; and the *Riband*, one-half the cottise. The bend is sometimes borne between two cottises, in which case it is said to be *Cottised*, a term sometimes applied with doubtful propriety to the other ordinaries when accompanied with their diminutives.

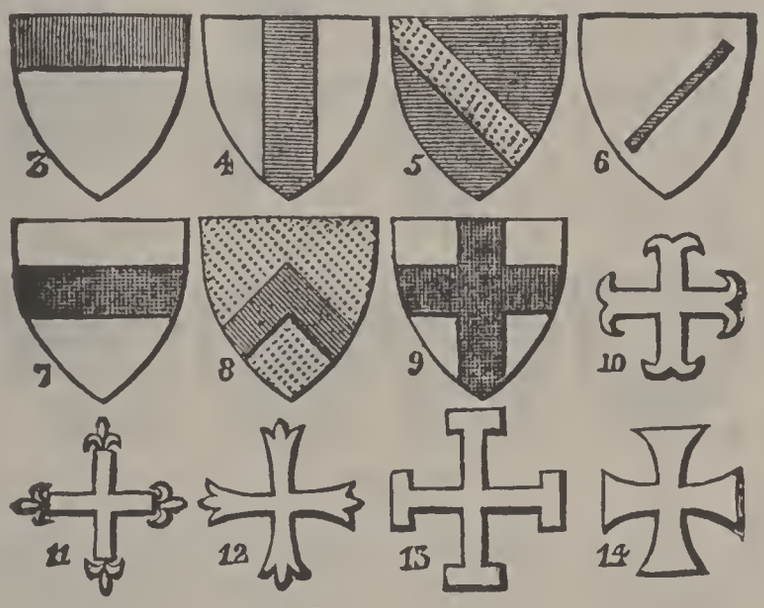
4. The *Bend Sinister*, diagonal band from sinister chief to dexter base: its diminutives are the *Scarpe*, one-half of the bend sinister; and the *Baton* (fig. 6), one-half of the

scarpe. The baton stops short of the extremity of the field at both ends, and has been considered a mark of illegitimacy. See Bastard Bar.

5. The *Fess* (fig. 7), horizontal band in the middle of the shield, said, like the ordinaries already enumerated, to occupy one-third of it: its principal diminutive is the *Bar*, containing the fifth part of the field; and there are also the *closet*, one-half of the bar, and the *Barrulet*, one-half of the closet, the later seldom borne singly.

6. The *Chevron* (fig. 8), two stripes descending from the centre of the shield in diagonal directions like the rafters of a roof: its diminutives are the *Chevronal*, of half, and the *Couple-close*, one-fourth its width, the latter borne as its name implies, in pairs, and generally accompanying the chevron—on each side of it.

7. The *Cross* (fig. 7), uniting the pale and fess, an ordinary originally like the rest, composed of the clamps necessary to the strength of the shield, but had also the deeper meaning of the symbol of the Christian faith. Besides its plain form, the cross was varied in numerous



Figs. 3—14.

ways, most of these varieties being, however, common charges rather than ordinaries. Of the 39 lesser crosses mentioned by Guillim, and 109 by Edmonson, a few of the most frequent are the following: *Cross moline* (fig. 10), with the ends turned round both ways; *Cross fleury* (fig. 11), of which each limb terminates in a fleur-de-lis; *Cross patonce* (fig. 12), each limb of which has three points; *Cross potent* (fig. 13), crutch-shaped at the ends; *Cross pattée* (fig 14), small in the centre, but widening toward the ends; *Cross crosslet* (fig. 15), crossed at the ends. The latter is the most frequent of all, and borne oftener in numbers than singly. Any of these crosses is said to be fitchée, when the lower limb terminates in a sharp point, as in fig. 16. There is also the *Cross Maltese*, whose limbs have each two points, and converge to a point in the centre of the cross; though not frequent as a heraldic charge, it derives an

importance from being the badge of the Knights of Malta and of many other orders.

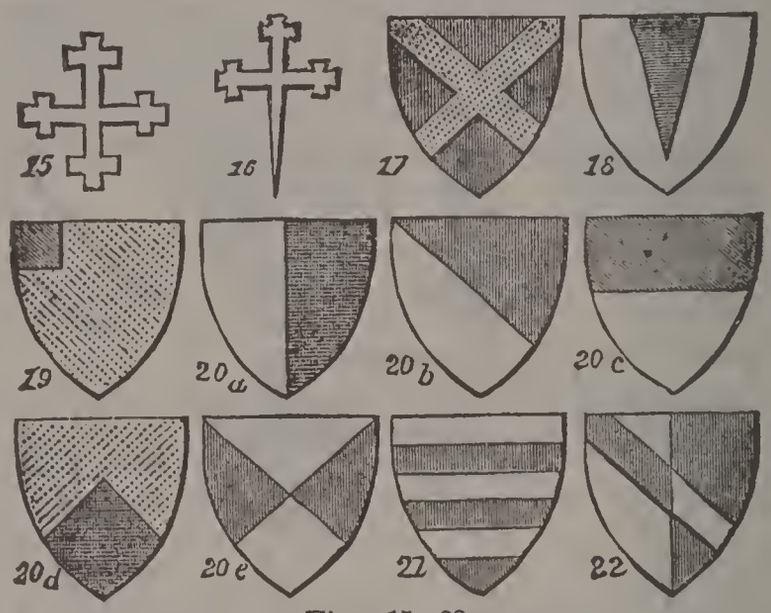
8. The *Saltire*, or St. Andrew's Cross (fig. 17), formed by a junction of the bend dexter and bend sinister.

9. The *Pile* (fig. 18), wedge with the point downward: a single uncharged pile should, at its upper part, occupy one-third the breadth of the shield, but if charged, it may be double that width.

10. The *Quarter*, consisting of the upper right-hand fourth part of the shield cut off by a horizontal and a perpendicular line: its diminutive is the *Canton* (fig. 19).

Armorial figures may be depicted on any of these ordinaries, but not on their diminutives, with the exception of the canton.

We observed that the field of an escutcheon may be of two different tinctures, divided by a partition-line, which



Figs. 15—22.

line may vary in direction. When divided by a partition-line in the direction of one of the ordinaries, the shield is said to be *Party per* that ordinary; thus we may have (fig. 20) a shield party per pale, bend, fess, chevron, or saltire. An escutcheon divided as by a cross is said to be quartered. A shield divided into any number of parts by lines in the direction of a pale, bend, or bar, is said to be *Paly, Bendy, Barry*, the number of pieces being specified, as in the example fig. 21, barry of six, argent and gules. When the field is of a metal and color separated by any of the lines of partition, then the charge placed on it is said to be *Counter-changed;* this means that the part of the charge which is on the metal is of the color, and *vice versâ*, as in fig. 22, the arms borne by Chaucer the poet, per pale argent and gules, a bend counter-changed.

The partition-line which bounds the field, or the boundary-line of an ordinary, is not always even. Fig. 23 represents the commonest forms of irregular partition-lines in use, viz., the *engrailed, invected, wavy, nebulé, embattled, indented*, and *dancetté*. An ordinary engrailed has the

points of the engrailed line turned outwards, and an ordinary invected, inwards. Dancetté differs from the indented by the partition-line being marked with only three indentations.

The *Subordinaries*, or subordinate ordinaries, are, generally, enumerated as the following, though there is no very clear line of demarcation between them and the common charges.

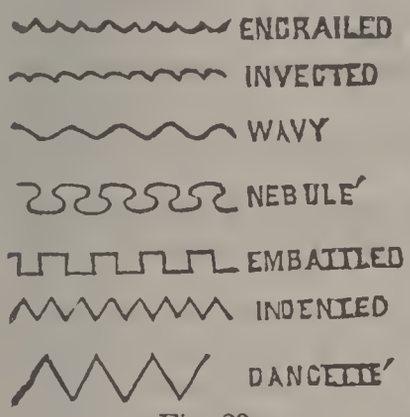
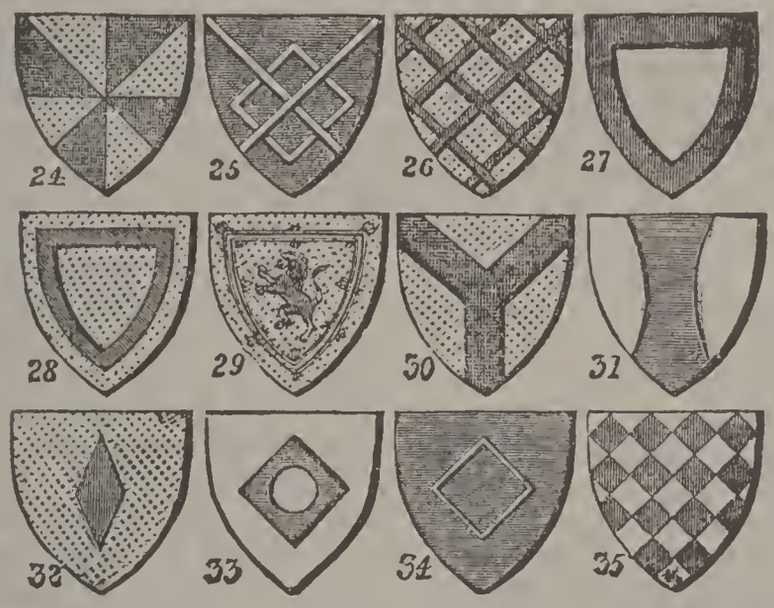


Fig. 23.

1. The *Gyron.*—When a shield is at once quartered and party per saltire, as in fig. 24, the division is called *Gyronny of eight* (from *gyrus*, a circle), and one of the triangles, or at least the triangle in dexter chief, is a gyron. Gyronny of six, ten, or twelve also occasionally occur, so called according to the number of the triangles.

2. The *Fret* (fig. 25) is a cognizance derived from the banding or ornamenting of the shield, and a shield covered with this lattice-work decoration (fig. 26) is said to be *Fretty*.

3. The *Bordure*, or border (fig. 27), stripe encircling the shield; much used to distinguish different branches of a family, and is often charged with small devices, on which



Figs. 24—25.

account it has sometimes been reckoned an honorable ordinary.

4. The *Orle* (fig. 28) differs from a bordure in not touching the extremity of the shield.

5. The *Tressure*, regarded as a diminutive of the orle, is generally borne double, and flory counter-flory, as in the arms of Scotland, or, a lion rampant within a tressure flory counterflory gules (fig. 29).

6. The *Pall* (fig. 30), the archiepiscopal ornament of that name, sent from Rome to metropolitans, and resembling in form the letter Y.

7. The *Flanches* (fig. 31), the dexter and sinister sides of the shield cut off by a curved line· these are always borne in pairs, and sometimes charged.

8. The *Lozenge*, figure of four equal sides, with the upper and lower angles acute, and the others obtuse.

9. The *Fusil* (fig. 32), longer and more acute than the lozenge.

10. The *Rustre* (fig. 33), lozenge pierced round in the centre.

11. The *Mascle* (fig. 34), lozenge perforated, and showing a narrow border. Mascles were probably originally links of chain-armor.

A field is said to be *Lozengy* (fig. 35), *Fusilly* or *Mascally*, when divided by diagonal lines in the direction of these subordinaries. A field divided by horizontal and perpendicular lines into squares of different tinctures, is said to be *Checky;* in the case of a *Fess checky* there are three such rows of squares.

Among subordinaries are sometimes reckoned certain circular charges called *Roundels* or *Roundlets*, distinguished in English heraldry by different names according to their tinctures. When of or, they are called *Bezants;* of argent, *Plates;* of gules, *Torteaux;* of azure, *Hurts;* of purpure, *Golpes;* and of sable, *Ogresses* or *Pellets*.

We come now to the third class of figures occurring in armorial bearings. We have seen that the ordinaries and subordinaries are for the most part purely heraldic figures, connected in their origin with the shield itself; the *common charges*, on the other hand, are representations more or less conventional of familiar objects, which have no necessary relation to the shield; but are in some way emblematic as concerns family or individual history and character. The knights, in the early days of heraldry, ransacked the animal, the vegetable, and the mineral kingdom, as well as the range of things natural and artificial, for cognizances which would be distinctive, and at the same time suggestive, of the name or title of the bearer of them. We enumerate a few of the most frequent charges.

Of beasts, the *lion* requires special mention. The king of beasts is one of the most frequent of heraldic devices, and is made to assume a great variety of attitudes (see LION). Lions and other beasts of prey are said to be *armed* or *langued* of any tincture when their teeth and claws, or their tongue, is of that tincture. With some change of color or position, the royal beast came to be used by all who could claim kindred, however remote, with royalty, and lions were further multiplied by augmentations granted by the sovereign to favorite followers. The heraldic *leopard*, the subject of much controversy, was originally but another designation for the lion passant-gardant. Bears, boars, bulls, stags, are favorite heraldic beasts. A stag walking is said to be *trippant;* he is *at gaze* when a lion

would be statant-gardant; he is *attired* of any tincture when his horns are of that tincture. The animals that possess horns and hoofs are said to be *armed* and *unguled* in respect of them. The heads and limbs of animals are often borne as charges, and they may be either *couped*, cut off in a straight line, or *erased*, cut off with a jagged edge.

Of birds, we have first the *eagle*. The sovereign of birds, and symbol of imperial Jove, was, next to the lion, the most favorite cognizance of royal personages, and was adopted by the German emperors, who claimed to be successors of the Cæsars of Rome. The imperial eagle had at first but one head; the monstrosity of a second head seems to have arisen from a dimidiation of two eagles, to represent the eastern and western empire (see MARSHALLING OF ARMS). The eagle of heraldry is most generally *displayed*, i e., its wings are expanded; sometimes it is *preying*, or standing devouring its prey. The *alerion*, the cognizance of the duchy of Lorraine, and the family of Montmorency, was originally but a synonym for the eagle assumed (M. Planché suggests) as an anagram for the word Loraine, but modern heralds have degraded it into a nondescript creature without beak or claws. The *martlet* was originally a martin, a species of swallow, which has also in course of time been deprived by heralds of its legs and beak. The pelican, the swan, the cock, the falcon, the raven, the parrot or popinjay, and the peacock, are of frequent occurrence. The *pelican* has generally her wings *indorsed*, or placed back to back, and is depicted pecking her breast. When in her nest feeding her young, she is called a pelican *in her piety*. A peacock borne affronté with his tail expanded, is said to be *in his pride*. Birds of prey are *armed* of the color of which their beak and talons are represented. Such as have no talons are *beaked* and *membered*. The *cock* is said to be *armed*, *crested*, and *jelloped*, the latter term referring to his comb and gills. Birds having the power of flight are, in respect to their attitude, *close*, *rising*, or *volant*. Fishes and reptiles occur as charges: the former are said to be *naiant*, if drawn in a horizontal, and *hauriant*, if drawn in a perpendicular position; and the *dolphin*, in reality straight, is conventionally borne *embowed* or bent. The *escallop shell* is of frequent occurrence, and said to be the badge of a pilgrim. Sometimes the conventional heraldic form of an animal differs from its true form, as in the case of the *antelope* of heraldry (fig. 36), which has the head of a stag, a unicorn's tail, a tusk issuing from the tip of the nose, a row of tufts down the back of the neck and similar tufts on the tail, chest, and thighs. Of 'animals phantasticall' we have among others the gryphon, wyvern, dragon, unicorn, basilisk, harpy. We have the human body in whole or part, a naked man, a savage or wild man of the woods, also arms, legs, hearts, Moors' heads, Saracens' heads, and that strange heraldic freak, the three legs conjoined, carried in the escutcheon of the Island of Man.

Fig. 36.

Of plants, we have *roses, trefoils, cinquefoils, leaves garbs* (i e., sheaves of corn), *trees*, often *eradicated* or *fructuated* of some other color, and above all, the celebrated *fleur-de-lis*, used as a badge by Louis VII. of France before heraldry had existence. When a plant, animal, or other charge is blazoned *proper*, what is meant is that it is of its natural color.

The heavenly bodies, the sun, moon, and stars, also are pressed into the service of heraldry, as are things inanimate and artificial without number, particularly such as were familiar to the warriors and pilgrims of the 12th and 13th c. Helmets, buckles, shields, hatches, horseshoes, swords, arrows, battering-rams, pilgrims' staves, mullets (or spur-rowels), and water-bougets, or bags, in which in crusading times water was carried long distances across the desert, also the clarion or war-trump, generally and erroneously called a *rest*. Even the letters of the alphabet have been used as charges.

Charges may be placed either simply on the field or on one of the ordinaries; in some instances, one of the ordinaries is placed over a charge, in which case the charge is said to be *debruised* by the ordinary. Three charges of one kind are placed two above and one below, unless blazoned *in fess* or *in pale*. In the 14th and 15th c. the simplicity of early heraldry began to be departed from by accumulating a variety of charges on one shield, and in later times we have sometimes a charge receiving another charge like an ordinary. The growing complexity of shields arose from augmentations granted to distinguish the younger branches of a family, or charges assumed from the maternal coat by the descendants of an heiress. In the end of the 18th, and beginning of the 19th c. a practice prevailed for a time of introducing into armorial bearings matter-of-fact landscapes, representations of sea-fights, and of medals and decorations worn by the bearer, setting all heraldic conventionalities at defiance, and dealing in details not discernible on the minutest inspection. The grants proceeding from the present kings of arms are more conformable to the usage of heraldry.

The arms of the different members of a family have been distinguished from one another, sometimes by the use of a bordure or other difference, and sometimes, especially by English heralds, by the use of certain figures called *marks of cadency*, the *label*, *crescent*, *mullet*, *martlet*, *annulet*, *fleur-de-lis*, to designate the eldest, second, third, fourth, fifth, or sixth son and his descendants—an invention originating about the time of Henry VII., but which cannot consistently be carried through all the ramifications of a family for a succession of generations. See CADENCY.

Blazonry is an essential part of the science of arms. To blazon a coat is so to describe it that any one with an ordinary knowledge of heraldry will be able to depict it correctly. In the language of blazonry, all tautology must be avoided. The tincture of the field is first mentioned; the ordinary, if any, follows, unless it be a chief; then the

charges between which the ordinary is placed. The charges on the ordinary follow, and lastly we have a canton, or chief, and marks of cadency. For the rules of blazoning, see BLAZON—BLAZONRY.

Besides the heraldic devices depicted on the shield, there are the following borne external to it—the helmet, the mantling, the wreath, the crest, the motto and scroll, the supporters, and the coronet.

The *helmet*, originally a piece of defensive armor, became in the course of time one of the usual accompaniments of the shield; and placed over the arms, it came by its form to mark the rank of the wearer. For these distinctions, recent, and applicable only to British heraldry. See HELMET.

The *mantling* is an embellishment of scroll-work flowing down on both sides of the shield, and originating in the *cointoise*, or scarf, wrapped round the body in the days of coat-armor.

From the centre of the helmet, within a *wreath* of two pieces of silk of the first two colors of the armorial bearings, issues the *crest*, originally a special mark of honor worn only by heroes of great valor or advanced to a high military command; now an inseparable adjunct of the coat of arms in English, though not in continental, heraldry, and often assumed or changed arbitrarily without proper authority.

The *scroll*, placed over the crest or below the shield, contains a *motto*, bearing in many cases an allusion to the family name or arms.

Supporters are figures or animals standing on each side of the escutcheon, and seeming to support it. They were in their origin merely ornamental devices, which gradually acquired heraldic character. In England, the right to use supporters is confined to the royal family, peers, peeresses, and peers by courtesy, knights of the Garter, knights grand cross of the Bath, and a very few families whose ancestors bore supporters before their general use was restricted. In Scotland, supporters are also used by the baronets of Nova Scotia and the chiefs of various families.

The crown of the sovereign, the mitre of the bishop, and the coronet of the nobility are adjuncts appended to the shield of those whose dignity and office entitle them to that distinction. For a description of the crown of Great Britain and the coronets of the royal family, see CROWN. For the coronets appropriated to different ranks of nobility, see DUKE; MARQUIS; EARL; VISCOUNT; BARON.

As to arrangement of various coats in one escutcheon, see MARSHALLING OF ARMS. A husband is entitled to *impale* the arms of his wife, i.e., to place them on the same shield side by side with his own. When the wife is an heiress, the husband bears her arms in an *escutcheon of pretense*, or small escutcheon in the centre of his own shield, and the descendants of the heiress may quarter her arms with their paternal coat. A sovereign also quarters the arms of his several states, and feudal arms are sometimes

quartered by subjects. An elective king, it is said, may place his hereditary arms on an escutcheon of pretence over the insignia of his dominions.

For information on the details of heraldry, reference is made to the standard works of Guillim, Edmonson, and Nisbet, and for a more discriminating view of the subject, to such recent treatises as Montague's *Heraldry*, and Planché's *Pursuivant of Arms*.

HER'ALDS' COL'LEGE, or COL'LEGE OF ARMS: collegiate body, founded by Richard III., 1483, consisting of the heraldic officers of England, who were assigned a habitation in the parish of All-hollows-the-Less, London. Various charters confirmed the privileges of the College of Arms, and it was reincorporated by Philip and Mary, who bestowed on it Derby House, on whose site, in Doctors' Commons, the present college was built by Sir Christopher Wren.

The presidency of the college is vested in the earl marshal, an office now hereditary in the family of Howard, Duke of Norfolk; he nominates the three kings of arms, six heralds, and four pursuivants, who are the members of the collegiate chapter. Persons having a hereditary claim to arms, which has been disused for one or more generations, are empowered by the Herald's College to resume them, on proof and registration of pedigree. A person who has no hereditary claim, and wishes a grant of arms, must memorialize the earl marshal, and show that he is in a condition to 'sustain the rank of gentry.' An important department of the Heralds' College is the recording of pedigrees. Any pedigree showing the existing state or descent of a family may, if accompanied with sufficient evidence, be entered on the books of the college. The members of the college have salaries, but derive their principal income from fees charged for assistance in tracing pedigrees and titles, and for the granting and registration of arms. In Scotland, the corresponding functions belong to the LYON COURT (q.v.).

HERAT, *hĕr-ăt':* capital of the most westerly of the three divisions of Afghanistan, on the river Heri, 2,500 ft. above the sea; lat. 34° 50′ n., long. 62° 30′ e.; 390 m. w. of Cabul. Situated near the boundaries of Afghanistan, Persia, and Independent Tartary, Herat is one of the principal marts of central Asia; also it has extensive manufactures of its own in wool and leather. The vicinity, naturally fertile, has been rendered much more so by irrigation. But the city claims notice mainly on political and military grounds. Long the royal seat of the descendants of Timur, and often an object of contention between the warlike tribes all round, it is fortified by a ditch and wall, and is commanded on its n. side by a strong citadel. In more modern times, the place has acquired a kind of European importance, for its central situation on all lines of communication—being, toward Persia, the key of Afghanistan, which, again, in turn affords the only approach by land to Western India; hence Herat has been viewed as an outpost

of England's Indian empire against Russian intrigue and encroachment. It has been the subject of treaties and the occasion of wars between Great Britain, as mistress of Hindustan, and Persia, as virtually a vassal of Russia. This feature of the history of the city was specially developed in connection with the last conflict between Persia and England. In 1856, Nov., the shah, regarded by the British government as the vassal and agent of the czar, captured Herat, while actually conducting negotiations for an amicable adjustment at Constantinople; but he was within a few months, constrained to relinquish his prey and renounce his claims by a British expedition directed against the opposite extremity of his empire. The population has fluctuated within the century from 100,000 to 10,000; the average pop. now being about 30,000.

HERAULT, *ā-rō'*: maritime department in s. France, bounded s.e. by the Gulf of Lyon. It is oval in form, 84 m. in greatest length from e. to w.; 2,436 sq. m.; pop. (1901) 489,421. It is occupied in the n. and n.w. by the Lower Cevennes mountains, from which several branches of moderate elevation extend south, gradually subsiding as they approach the sea. The principal rivers are the Herault (from which the dept. is named), the Orb, and the Lez, which, rising in the Cevennes, pursue a generally southward course to the Mediterranean. The coast-line is about 66 m. in length; and along the shore, from Agde to the Vidourle, are numerous *étangs*, or marshy lakes, united by the Canal-des-Etangs, and communicating with the sea. In the neighborhood of the *étangs*, the climate is unhealthful, especially in summer, when agues and fevers prevail; but elsewhere throughout the dept. it is unusually fine. About a fourth of the entire area is arable and about a sixth is under vineyards. The dept. stands, for quantity, next to Aude, at the head of the wine-growing departments of France, the annual produce being about 130,000,000 gallons. From the shore-lakes and the sea, immense quantities of fish are obtained. Woolen, silk, and cotton fabrics, in great variety, are largely manufactured. Coal and copper-mines, and quarries yielding variously veined marbles, building-stone, granite, etc., are worked. Herault supplies a great quantity of the salt used in France. It is divided into four arrondissements. Montpellier is the capital.

HERB, n. *hėrb* [F. *hėrbe*—from L. *herba*, grass, vegetation]: a plant or vegetable with a soft stalk or stem; a herbaceous plant as opposed to one with a woody stem above ground. In some herbs the stem is woody, but still annual. There is, however, in many a permanent woody *rhizome* or root-stock.—In *books of gardening*, plants used only for flavoring are sometimes distinguished as *sweet herbs*, as mint, and basil; while those valued for nutritive qualities are known as *pot herbs*. HERBACEOUS, a. *hėr-bā'shŭs* [L. *herbācĕŭs*, grassy]: pertaining to or having the nature of herbs; applied to any portions of a plant more particularly green and succulent. HERBAGE, n. *hėr'bāj*

[F].: grass; pasture; herbs collectively. HER'BAL, n. *-băl*, a book which contains a classification and description of plants; a collection of specimens of plants dried and preserved: ADJ. pertaining to herbs. HER'BALIST, n. *-ĭst*, one who collects or sells herbs; a practical botanist. HER'BARY, n. *-bĕr-ĭ*, a. herb-garden. HERBES'CENT, a. *-bĕs'ĕnt* [L. *herbes'cens* growing green]: growing into herbs. HERBIV'ORA, n. plu. *-bĭv'ŏ-rā* [L. *voro*, I eat]: an order of ungulate or hoofed animals, feeding wholly on herbs or vegetables. Naturalists vary in their classification of animals in this order. HERBIV'OROUS, a. *-rŭs*, eating or living on herbs or vegetable substances. HERBORIZE, v. *hĕr'bŏr-īz*, to search for plants, or seek for new species. HER'BORIZING, imp.: N. going about seeking for and gathering medicinal herbs. HER'BORIZED, pp. *-īzd*. HER'BORIZA'TION, n. *-zā'shŭn*, act of seeking for plants in the field; figures of plants in mineral substances. HERBOSE, a. *hĕr-bōs'*, or HERBOUS, a. *hĕr'bŭs*, abounding with herbs. HERBAR, n. *hĕr'bâr*, in *OE.*, a collection of flowers. HER'BARISM, n. *-ĭzm*, in *OE.*, the business or study of the herbarist. HER'BARIST, n. *-ĭst*, in *OE.*, one skilled in the names and virtues of herbs. HERBELET, n. *hĕr'bĕl-ĕt*, a small herb. HERBY, a. *hĕr'bĭ*, in *OE.*, having the nature of herbs or pertaining to them.

HERBARIUM, n. *her-bā'rĭ-ŭm* [Lat. *herbāriŭm*, book describing herbs; *herbāriŭs*, one having knowledge of plants (see HERB)], called also *Hortus Siccus* [Lat. dry-garden]: prepared collection of dried plants for the study and examination of botanists. For collecting plants, a box of tinned iron, called a *vasculum*, is generally used, which preserves most plants from withering for at least some hours. Plants intended for the herbarium should be collected on a dry day; plants which when gathered have moisture on their leaves, should, when brought home, be set in a vessel of water, and there allowed to dry. Plants with thick succulent stems or leaves are immersed for a few seconds in boiling water to kill them, lest they should continue to grow. The specimens are then laid between layers of blotting-paper, or of a thick bibulous kind of paper called botanical drying-paper, not spread out with anxious minuteness, nor so placed as to distort their parts. The number of sheets of paper in each layer is accommodated to the nature of the plants, and pressure is applied by weights, screws, or straps, the whole being enclosed in boards, and the layers of paper, when very numerous, having also boards occasionally interposed. Care must be taken that too much pressure be not applied at first , lest the parts of the plants be unfitted for future examination. For a short time, the paper is changed every day, or every second day, dry paper being supplied. Specimens have the best appearance which are quickly dried. Some plants which, in spite of all care, lose their natural colors in the ordinary method of drying, and become black, as orchids, may be beautifully dried by inclosing the layers of paper in a network wire-frame, and hanging the package before

a fire, where it is turned round like meat roasting. Specimens are thus dried in a few hours, which otherwise would have required eight or ten days.—When the specimens are fully dried, they are laid within sheets of writing paper, or they are gummed or glued to sheets of paper, the name of the species, with the locality, date of collection, and any other interesting particulars being marked beside each. As much as possible of each plant is preserved in the herbarium, but the flower and leaf must always be exhibited. Some parts of plants, as succulent roots, fruits, etc., are otherwise preserved. The herbarium is arranged according to a botanical system. The methods differ: in the United States, usually, the species in the genera, and the genera in the orders, are arranged alphabetically, and the orders serially; sometimes genera are placed alphabetically throughout without regarding the orders. The alphabetical system has advantages; but in Europe it is seldom used, on account of its counter-balancing inconveniences in practice. Better than keeping a catalogue of the species in the herbarium, constantly needing changes by additions, is the plan of marking in some systematical botanical work, the species contained, and those added. Care must be taken to preserve the herbarium from the ravages of moths and beetles by frequent inspection, by the aid of camphor, and by the occasional application of a little corrosive sublimate. There are herbaria in existence which are centuries old, and which are still consulted for identification of species. The herbarium enables us to compare plants with flowers at different seasons, and those of different countries. The herbaria formed by travellers have been of great importance to the progress of botany.

HERBART, *hĕr'bârt*, JOHANN FRIEDRICH: 1776, May 4—1841, Aug. 16; b. Oldenburg: German philosopher. He was educated at Jena. At a very early age, he was familiar with religious and metaphysical doctrines and discussions, and at 12 years had read the systems of Wolff and Kant. He became the pupil of Fichte, and received his philosophy with enthusiasm; but after more reflection, he found himself obliged to reject much of his system, and to form one of his own. In 1805, he was appointed extraordinary prof. at Göttingen; in 1809, he obtained the chair of philosophy at Königsberg. In 1833, he returned to Göttingen, where he remained till death. His collected works were published by his scholar Hartenstein (12 vols. Leipz. 1850–52).

The starting-point of Herbart's metaphysics is the thesis that the ordinary (metaphysical or popular) conceptions of a thing with attributes, change, matter, and self-consciousness contain in themselves contradiction. The multiplicity and variety of the world of phenomena cannot be explained on the hypothesis of only one real (substance); a multiplicity of reals (monads) must be assumed, and out of their mutual relations, time, space, nature, and thought arise. In ethics Herbart rejects Kant's autonomy of the pure

reason as basis, and founds on developed and cultured feeling or common sense—in this resembling Shaftesbury. The five practical ideas are freedom, perfection, benevolence, justice, and fairness. In opposition to contemporary idealism, Herbart called his system realism. Herbart has exerted most influence in psychology and pedagogy. In substituting simple elements in consciousness for the faculties of Kant, and using mathematical methods, he endeavored to make psychology an exact science. In this he partly succeeded, though he was unable to free his psychology from serious metaphysical encumbrances. He may perhaps fairly be said to be the father of modern German psychology. He was among the first to see the importance of psychology for pedagogy, and the present educational theories of apperception, interest, and correlation of studies in curricula owe much to him.

HERBELOT, *ĕr-blō′*, Barthelemy D': 1625, Dec. 4—1695, Dec. 8; b. Paris: orientalist. He became prof. of Syriac in the College of France, and died at Paris. His celebrated work, *Bibliothèque Orientale*, was published after his death by Galland (Paris 1697), afterward with a supplement (Maestricht 1776–81); but the best edition was published at the Hague (1777–82, 4 vols.). It is unfortunate that Herbelot was unable to give the finishing touch to a work which had cost him so much labor and research, and which, in spite of the errors and omissions and even contradictions, still bears a deservedly high character. It contains extracts from a multitude of Arabian, Persian, and Turkish authors.

HERBERMANN, Charles George, educator, editor, and author, b. near Munster, Westphalia, Prussia, 1840, Dec. 8. He came to the U. S. with his parents in 1851, and was graduated from the College of St. Francis Xavier, N. Y. was graduated from the College of St. Francis Xavier, N. Y., 1858, and received the degrees of A.M., PH.D., LL.D., and LIT.D., at various dates; immediately after his graduation he became an instructor in the college, and retained that position until 1869. In that year he was appointed prof. of the Latin language and literature in the College of the City of New York, a position which he still fills. In 1873 the library of the college was confided to his care. In 1874 he was prest. of the Catholic Club of the City of New York. When in 1897 he was chosen prest. of the U. S. Catholic Historical Soc. he became the editor of the *Historical Records and Studies*, the annual published by that society. He also edited for the same society the *Unpublished Letters of Charles Carroll of Carrollton*, and Thebaud's *Forty Years in the United States*.

Among his other publications are *Business Life in Ancient Rome*, editions of Sallust's *Jugurthan War* and *Catilinarian War* and a translation of Torfeson's *History of Vineland*. He contributed to various periodicals and papers on the History of Education in Egypt, Babylonia, and Greece, and on the educational value of the classics,

articles on the Norse discovery of America, and the early cartography of this continent and the origin of Geography, and many other historical subjects. In 1905 he became editor-in-chief of the *Catholic Encyclopedia*. He is a member of the Archælogical Institute of America and of the American Geographical Soc.

HERBERT, *her'bërt:* family prominent in British history. The Herberts came over to England in the train of William the Conqueror; Herbert, Count of Vermandois, is mentioned in the Roll of Battle Abbey. In the reign of Henry V., Sir William Herbert of Raglan Castle, co. Monmouth, received the honor of knighthood for his valor in the French wars. His eldest son, a stanch adherent of the House of York, was created Earl of Pembroke* by Edward IV. 1469, but fell into the hands of the Lancastrians after the battle of Danes, Moor, and was beheaded the following day, when the title became extinct. It was, however, revived 1551, in the person of his (illegitimate) grandson, William Herbert, K.G., one of the most influential noblemen of his age, and one who was active in public affairs, both as statesman and as soldier. It is recorded by Sir B. Burke, that 'he rode on February 17, 1552–3, to his mansion of Baynard's Castle, with 300 horse in his retinue, 100 of them being gentlemen in plain blue cloth, with chains of gold, and badges of a dragon on their sleeves.' He was buried in Old St. Paul's, and his funeral was conducted on such a scale of magnificence that, according to Stowe, the mourning given away on that occasion cost £2,000—a very large sum in those days. By his wife, who was a sister of Catharine Parr (last queen of Henry VIII.), he had a son Henry, second earl, K.G., to whose countess, Mary, daughter of Sir Henry Sydney, K.G., Sir Philip Sydney dedicated his *Arcadia*. She is celebrated by Ben Jonson in the well-known lines—

> Underneath this marble hearse
> Lies the subject of all verse—
> Sidney's sister, Pembroke's mother.

The fourth earl, some time lord chamberlain to Charles I., and chancellor of the Univ. of Oxford, was the founder of Jesus College in that seat of learning. The eighth earl held several high offices under Queen Anne, including that of lord high admiral. From him the present earl of Pembroke is directly descended. The Earls of Carnarvon, more than one of whom have gained celebrity in literature, descend from the eighth Earl of Pembroke, mentioned above. The present Earls of Powis are descended from the same stock maternally, the only child and heiress of the last Earl of Powis of a previous creation having married the eldest son of the illustrious Robert Clive, the founder of the British Indian Empire, in whose favor that title was renewed 1804.

HER'BERT, EDWARD (Baron HERBERT OF CHERBURY): 1582–1648, Aug. 20; b. Eyton, Shropshire; of noble family:

* The earldom of Pembroke was originally conferred on Richard de Clare, the celebrated Strongbow, who aided Henry II. in the conquest of Ireland.

commonly reckoned the first of the English deistical writers. In his Autobiography, he has described his early love for inquiry and his scrupulous truthfulness. He was sent to Oxford in his 12th year ,and before he had quite finished his studies, he married an heiress. On the occasion of the coronation of James I., he was made a knight, and invested with various offices. Although his marriage was not unhappy, there appears to have been little warmth of affection between him and his wife, who was considerably older than himself. He left home, accordingly, for travel in France, 1608, and from that time resided much abroad. In Paris, he lived on terms of intimacy with the Constable Montmorency, Jean Casaubon, and other distinguished men. After a brief return to his native country, he set out again 1610 for the Low Countries, where he joined the arms of the brave Maurice of Orange. For this prince he contracted a great affection, and again offered him his services 1614. After a campaign, he travelled through Germany and Italy on horseback, and went as far as Venice, Florence, and Rome. On his return, he fell into trouble by an attempt to raise a troop of Protestant soldiers in Languedoc for the Duke of Savoy. Shortly afterward he returned to England, and proposed to apply himself to study and philosophical inquiry; but high and important diplomatic duties awaited him. He was made a member of the privy council, and sent to France as extraordinary ambassador. His aim was to promote the alliance between France and England, and he was so far successful that he was appointed ordinary ambassador, and continued to reside at Paris. He tried, with small success, the difficult task of negotiation between Louis XIII. and his Protestant subjects. He was elevated first to be a peer of Ireland, and then 1630, five years after the accession of Charles I., to be a peer of England, with the title Baron Herbert of Cherbury. When a civil war broke out, he appears to have acted with hesitation, at first siding with the parliament, and then joining the king. His hereditary seat, Montgomery Castle, was attacked and burned. He died in London.

The character of Herbert, as depicted in his autobiography, is in main that of a gallant adventurer, fired equally with the love of arms and of arts, at once soldier and scholar. He is the gay man of the world, always truthful, honorable, and high-spirited; yet he has thoughts above those of the world; he ponders deeply the great questions of truth and religion, and has left the result of his speculations in his two treatises. *De Veritate* and *De Religione Gentilium.* He believes that in addition to the reason, man has a certain natural instinct which leads to the development of certain truths common to all men. The most important logical, ethical, and religious ideas are of this type. He states five of these religious ideas: (1) there is a God; (2) he ought to be worshipped; (3) virtue and piety are the chief elements of worship; (4) repentance is a duty; (5) there is a future life, with rewards and punishments. On the basis of these points he desires to establish a natural

religion which all might accept, and which would take the place of positive religion with its division into sects. He is thus the forerunner, if not the founder, of English Deism. See Charles de Remus at *Lord Herbert de Cherbury, sa vie et ses œuvres* (Paris 1873); Cf. Hallam's *Literary History.*

HER'BERT, GEORGE: English poet: 1593, Apr. 3—1633; b. near the town of Montgomery, Wales; fifth brother of Lord Herbert of Cherbury (q.v.). He was educated at Westminster, and was sent to Trinity College, Cambridge, about 1608. In 1615, he was elected fellow; and 1619, was promoted to the office of public orator. At the university, he made the acquaintance of Lord Bacon; and in the hope of preferment, he was induced to spend a considerable portion of his time about the court. On the death of James I., he changed his course, studied divinity, and finally took holy orders; and was made prebendary of Leighton Bromswold 1626. He married 1630; and in the same year received the rectory of Bemerton. Two years afterward at the early age of 39, he died. His principal poetical production, printed 1633, after his death, is entitled *The Temple, or Sacred Poems and Private Ejaculations*, and, though disfigured by fantastic conceits, has a quaint beauty, a pious simplicity, and in parts a sublimity of conception which give it high rank in poetry. It contains several passages of the purest pious verse which the language possesses. He wrote a prose work, *The Country Parson*, which lays down rules for the guidance of a clergyman's life, and which may be considered a pendant to *The Temple.* His life was written by Isaak Walton, and to that quaint and loving pen, in part, he owes his literary immortality.

HERBERT, *hĕr'bĕrt*, HENRY WILLIAM: author: 1807, Apr. 7—1858, May 17; b. London, England; son of the Dean of Manchester. He graduated at Oxford Univ. 1829, removed to the United States 1830, taught the classics in Newark, N. J., and New York 1831–40, published a number of novels 1837–55, started the *American Monthly Magazine*, wrote for the sporting papers and issued numerous work on American sports under the pen name *Frank Forester;* and in the last three years of his life applied himself to historical literature. His sporting works, by which he is best remembered, comprised *The Field Sports of the United States and British Provinces of North America*, 2 vols. (1848); *Fish and Fishing of the United States and British Provinces* (1849); *Complete Manual for Young Sportsmen* (1852); *American Game in its Season* (1853); and *Horse and Horsemanship in North America*, 2 vols. (1857).

HERBERT, HILARY ABNER: an American lawyer; b. in Laurensville, S. C., 1834, March 12; was educated at the universities of Alabama and Virginia; admitted to the Alabama bar; served in the confederate army in the civil war as captain and colonel of the 8th Alabama Infantry; and was disabled at the Battle of theWilderness. He resumed practice in Greenville after the war till 1872, when he removed to Montgomery; was a member of

Congress, 1873–93; secretary of U. S. navy, 1893–97; and afterward practiced in Washington.

HERBERT, Michael Henry: an English diplomatist; b. in England, 1857, June 25; d. Davos-Platz, Switzerland, 1903, Sep. 30. He entered the diplomatic service in 1877; was charge d'affairs in Washington, 1888–89; secretary of the British legation at Washington, 1892–93; at The Hague, 1893–94; at Constantinople, 1894–97; at Rome, 1897–98; and at Paris, 1898–99; and was appointed British ambassador to the United States, 1902, June 4.

HER'BERT, Sidney (Lord Herbert of Lea): English statesman: 1810–1861, Aug. 2; b. Richmond; son of the 11th Earl of Pembroke by his second wife. Educated at Harrow and at Oriel College, Oxford, he entered public life, and was sent to the house of commons 1832 for South Wilts, which he represented until his elevation to the peerage 1861. He began his political career as a conservative, and was sec. to the admiralty in Sir R. Peel's administration 1841–45, when he became sec-at-war. As a member of this administration, it fell to him to oppose Mr. Cobden's motion for a select committee to inquire into the effect of the corn-laws on farmers, and afterward, to argue in support of free trade in corn. He went out of office with his party 1846. In 1852 he was again sec.-at-war, under the Aberdeen ministry, and, in consequence, the 'horrible and heart-rending sufferings' of the army before Sebastopol were laid in a great degree at his door. He was for a few weeks colonial sec. in the first administration of Lord Palmerston 1855, and sec.-at-war in his second administration 1859. Great improvements in the sanitary condition and education of the army, the amalgamation of the Indian with the royal army, and the organization of the volunteer force, signalized his army administration. He largely reformed the war-office, and was applying himself with equal zeal and intelligence to his ministerial duties, when, owing to failing health, he resigned his seat in the house of commons, and 1861 was called to the upper house, under the title Baron Herbert of Lea. But release from labor came too late, for he soon afterward died. He was heir-presumptive to the 12th Earl of Pembroke. He had great aptitude for business, winning and genial manners, great readiness and fluency in debate, and a boundless philanthropy, and was a liberal patron of the arts

HERBERT, Victor, American musical director and composer: b. Dublin, Ireland, 1859, Feb. 1. After studying music from his childhood in Germany, he was appointed principal 'cello player in the court orchestra, Stuttgart, from which time he appeared in concerts throughout Europe. In 1886 he took the position of solo 'cellist in the Metropolitan orchestra, New York, and has since been connected as soloist and conductor with the principal orchestras of the United States, and since 1904 has conducted his own orchestra. As a composer he has written: *The Captive*, an oratorio; and the comic operas, *Prince Ananias; The Wizard of the Nile; The Serenade; Cyrano de*

Bergerac; The Ameer; The Viceroy; The Idol's Eye; The Fortune Teller; The Singing Girl; Babette; Babes in Toyland; It happened in Nordland; etc.

HERCULANEUM, *hĕr-kū-lā'nē-ŭm:* ancient city of Italy, at the n.w. base of Mount Vesuvius, about five m. e. of Naples. Only its buried ruins remain. Considerable obscurity envelops its early history; it is supposed, however, to have been of Phœnician origin, and to have been occupied afterward by Pelasgians and Oscans. It subsequently was conquered, with all the rest of Campania, by the Samnites, and later fell into the hands of the Romans. In A.D. 63, the city was seriously injured by a violent earthquake; and in 79 it was buried, with Pompeii and Stabies, by the memorable eruption of Vesuvius (q.v.). It now lies 70 to 120 ft. below the surface, and is filled up and covered with volcanic tufa, composed of sand and ashes, and consolidated to some extent by water, which is often thrown up in great quantities during volcanic eruptions. Above it, on the modern surface, are the two large villages Portici and Resina. In the latter, 1706, on the occasion of deepening a well, fragments of mosaics were first brought up: but little was done in the way of systematic excavation till 1738 when explorations were commenced under royal authority. It was then discovered that the building near the bottom of the well, from which the first relics were obtained, was the theatre. This building was forthwith explored and cleared, and several statues in bronze and marble were extracted from it. Excavations were limited in extent, not only by the hardness of the tufa, but from the fear of undermining the dwellings on the surface. Hence visitors can see only a very small portion of this entombed city. The chief edifice shown is the theatre, which had been very large, and was built but a short time before the fatal eruption. It has 18 rows of stone seats, and could accommodate 8000 persons. A basilica, two small temples, and a villa, also have been discovered; and from these buildings, many beautiful statues and remarkable paintings have been obtained. Among the art-relics of Herculaneum, which far exceed in value and interest those found at Pompeii, are the statues of Æschines, Agrippina, the Sleeping Faun, the Six Actresses, Mercury, the group of the Satyr and the Goat, the busts of Plato, Scipio, Africanus, Augustus, Seneca, Demosthenes, etc. These treasures, together with such vases and domestic implements as have been found, are in the Museum at Naples. Latterly, the portion of Herculaneum toward the sea, which had been covered only by loose ashes, has been laid open, and ancient buildings may now be seen there to advantage as well as at Pompeii. See PAPYRI.

HERCULEAN, adj. *hĕr-kū'lĕ-ăn* [Gr. *Herăklēs;* L. *Hercŭlēs*]: very great; difficult or dangerous; of extraordinary strength or power.

HERCULES, *hĕr'kū-lez* [Gr. *Herakles*], called likewise ALCIDES, *al-sī'dēz,* after his grandfather Alcæus: mythical hero of Hellas. He was son of Zeus and Alcmene, and

the most celebrated hero of the Greek legends, the ideal of human perfection, as conceived in the heroic ages; i.e., the greatest physical strength, connected with every high quality of mind and character which these ages recognized. He had a bitter enemy in Hera, who, knowing that the child who should be born that day was fated to rule over all the descendants of Perseus, contrived to prolong the travail of Alcmene, who was the daughter of Alcæus, son of Perseus, and hastened that of the wife of Sthenelus, another son of Perseus, who, after a pregnancy of seven months, gave birth to a son, named Eurystheus. Eurystheus thus, by decree of Fate, became chief of the Perseidæ. Pindar and subsequent writers relate, that, while yet in his cradle, Hercules showed his divine origin by strangling two serpents sent by Hera to destroy him. By Amphitryon's care, he was instructed in all arts by the first masters. Amphitryon now sent him into the country, where he tended the flocks till he was 18 years of age. During this period as the Sophist Prodikos relates in his poem, Hercules, meeting the goddesses of Pleasure and Virtue at the crossways, chose the latter to be the constant companion of his life.

His first exploit was the slaying of a lion, which haunted Mount Cithæron, and ravaged the dominions of King Thespios. Hercules was kindly received by the king, and at length succeeded in destroying the lion. On his return to his native city of Thebes, he not only freed it from the disgrace of having to pay tribute to the Orchomenians, but compelled them to pay double the tribute which they had formerly received. In return for this service, Creon, King of Thebes, gave him his daughter Megara in marriage. At this time Eurystheus summoned Hercules to appear before him, and ordered him to perform the labors which, by priority of birth, he was empowered to impose on him. Hercules, unwilling to obey, went to Delphi to consult the oracle, and was told that he must perform ten labors imposed by Eurystheus, after which he should attain to immortality. This reply plunged Hercules into the deepest melancholy, which Hera increased to madness, so that he killed his own children by Megara. When he recovered his senses, he returned, submitted to Eurystheus, and addressed himself to the labors imposed. The first labor was to destroy the lion which haunted the forests of Nemea and Cleonæ, and could not be wounded by the arrows of a mortal. Hercules boldly attacked him with his club, but in vain; and he was finally obliged to strangle him with his hands. From this time, he wore the lion's skin as armor. The second was to destroy the Lernæan hydra, which he accomplished with the assistance of his friend Iolaus; but because Hercules obtained assistance in this labor, Eurystheus refused to count it. His third was to catch the hind of Diana, famous for its swiftness, its golden horns, and brazen feet. The fourth was to bring alive to Eurystheus a wild boar, which ravaged the neighborhood of Erymanthus. The fifth was to cleanse the stables of

Augeas, King of Elis, where 3,000 oxen had been confined for many years, which he accomplished in one day, by turning the rivers Alpheus and Peneus through the stables. But as Hercules had gone to Augeas, and offered to perform this service on payment of a tenth of the cattle, and concealed the fact that he had been commanded to perform it by Eurystheus, the latter, hearing of this, judged that it must not be counted as one of the labors. His sixth was to destroy the carnivorous birds, with brazen wings, beaks, and claws, which ravaged the country near the lake Stymphalis, in Arcadia. The seventh was to bring alive to Peloponnesus a bull, remarkable for his beauty and strength, which Poseidon, at the prayer of Minos, had given to Minos, King of Crete, in order that he might sacrifice it, which Minos afterward refusing to do, Poseidon made the bull mad, so that it laid waste the island. Hercules brought the bull on his shoulders to Eurystheus, who set it at liberty. It appears again as the Marathonian bull in the story of Theseus. The eighth labor was to obtain the mares of Diomedes, King of the Bistones in Thrace, which fed on human flesh. The ninth was to bring the girdle of Hippolyta, Queen of the Amazons. The tenth labor was to kill the monster Geryon, and bring his herds to Argos. These were all the labors which were originally imposed on Hercules, but as Eurystheus declared the second and fifth unlawfully performed, Hercules was ordered to perform two more. The eleventh was to obtain the golden apples from the garden of the Hesperides. Atlas, who knew where to find the apples, brought them to Hercules, who meanwhile supported the vault of heaven; but according to others, Hercules went himself and stole the apples, after slaying the dragon who guarded them. The last and most dangerous labor was to bring from the infernal regions the three-headed dog Cerberus. Pluto promised him Cerberus on condition that he should use no weapons, but only force. When Hercules had brought the monster to Eurystheus, the latter, pale with fright, commanded him to be removed. Hercules set him at liberty, whereupon Cerberus immediately sank into the earth. Hercules was now free from his state of servitude.

To these well-known 'twelve labors,' must be added many other achievements, such as his battles with the centaurs and with the giants; his participation in the expedition of the Argonauts; the liberation of Prometheus and Theseus, etc. After accomplishing all these exploits, Hercules, while in a state of mental aberration, murdered his faithful friend Iphitus; he was afterward purified from the murder; but was compelled to sell himself for three years into slavery. When his period of slavery had expired, he returned to Peloponnesus, and some time afterward became a suitor for the hand of Dejanira, daughter of Œneus, King of Calydon, whom he married, after having overcome his rival Achelous. With her he now repaired to Trachinia. Having arrived at the river Evenus, he encountered the centaur Nessus. Hercules passed through

on foot; but Nessus, under pretense of carrying Dejanira over, attempted to offer her violence; whereupon Hercules slew him with an arrow dipped in the poison of the Lernæan hydra. Nessus, before expiring, instructed Dejanira how to prepare a love potion for Hercules. The hero now made war against Eurytos (king of Oechalia, who had defrauded him), slew him and his sons, and carried off his daughter Iole. Thence he went to Kenæon in Eubœa, and erected an altar to Zeus Kenæos, in order to celebrate the rite with due solemnity he sent Lichas to Trachis for a white garment. Dejanira, being jealous of Iole, anointed the robe with the philter that she had received from Nessus. Hercules put it on, and immediately the poison penetrated his bones. Maddened by the terrible pain, he seized Lichas by the feet, and flung him into the sea. He tore off the dress, but it stuck to his flesh, which was thus torn from his bones. In this condition, Hercules was conveyed by sea to Trachinia; and Dejanira being informed of what had occurred, destroyed herself. Hercules himself repaired to Mount Ætna, where he erected a funeral pile, and ascending it, commanded that it should be set on fire. The burning fire was suddenly surrounded by a dark cloud, in which, amid thunder and lightning, Hercules was carried up to heaven. There he became reconciled to Hera, and married Hebe.

According to most mythologists, there were several heroes of the name of Hercules. Among these are an Indian, an Egyptian, a Tyrian or Phœnician, and a Theban Hercules. The last is the most celebrated, and to him the actions of the others have possibly been attributed. Others, who, would explain the story of Hercules symbolically, assert that it conceals an astronomical idea; while others discover in this myth the history of the early development of Greece. On the astronomical hypothesis, the twelve labors of Hercules are simply the course of the sun through the 12 signs of the zodiac, which the plastic poetry of the Greeks has converted into a legend. According to Max Müller, Hercules was the Sun-god, and the legend of his death symbolizes the sunset: 'In his last journey Hercules proceeds from east to west. He proceeds from the Kenæan promontory to Trachis, and then to Mount Ætna, where his pile is raised. The coat which Dejanira sends to the solar hero is an expression frequently used in other mythologies, it is . . . . the clouds which rise from the waters, and like dark raiment surround the sun. Hercules tries to tear it off, i.e., his fierce splendor breaks through the thickening gloom, but fiery mists embrace him, and are mingled with the parting rays of the sun, and the dying hero is seen through the scattered clouds of the sky tearing his own body to pieces, till at last it is consumed in a general conflagration.'

Festivals were celebrated in honor of Hercules, at which his exploits were sung. In this manner arose the *Heracleia*, long poems celebrating the life and actions of Hercules. Hercules is represented in plastic art as the ideal of a hero. Strength is the characteristic idea,

developed by the sculptors Myron and Lysippus in a form not to be surpassed. A complete series of representations of the 12 labors may be seen in the vases of Volce. The conflict with the giants is frequently found on vases of the oldest style; the one on the casket of Cypselos is particularly worthy of notice. Hercules figure is generally youthful.

HERCULES, PILLARS OF: the name given by the ancients to the two rocks forming the entrance to the Mediterranean at the Strait of Gibraltar. Their erection was ascribed by the Greeks to Hercules, on the occasion of his journey to the kingdom of Geryon. According to one version of the story, they had previously been united, but Hercules tore them asunder, to admit the flow of the ocean into the Mediterranean; another version represents him as causing them to unite temporarily to form a bridge. The pillars are not mentioned in Homer, though he speaks of Ulysses' passage out of the Mediterranean into the ocean and back, showing an apparent knowledge of the existence of the strait. The first author who mentions them is Pindar, who places them at Gades (Cadiz), and his opinion had many followers in later times. The most general opinion, however, identified them with Calpe (now the Rock of Gibraltar) and Abyla (now Ceuta), in Africa. The ancients supposed these rocky capes to be the western limits of the world.

HER'CULES BEE'TLE (*Scarabæus Hercules*, or *Dynastes Hercules*): coleopterous insect of family *Lamellicornes*, tribe *Scarabæides*, remarkable not only for great size—it being five inches long—but for the singular appearance of the male; an enormous horn projecting from the head, and being opposed by a similar but smaller projection of the thorax, the whole resembling a pair of great but somewhat unequal pincers, of which the body of the insect is the handle. It is a native of Brazil.

HERCYNIAN FOREST, *hėr-sĭn'ĭ-an fŏr'ĕst* [Lat. *Hercynia silva;* Gr. *Herkynia hylē*, or *Herkynion oros*]: general designation of the entire wooded mountain-range of Middle Germany, from the Rhine to the Carpathian Mountains. Different ancient writers, however, apply the name sometimes to one part, sometimes to another of the range. Aristotle makes the Ister (or Danube) take its rise in it. Cæsar, who estimates it at 9 days' journey in breadth, and 60 in length, comprehends under this name all the mountain-ranges in Germany n. of the Danube; while some of them identify it with the Bohemian Forest, and others with the Thuringian Forest. Modern geographers apply the term, mostly in a very arbitrary manner.

HERD, n. *hėrd* [Icel. *hirda*, to keep, to guard: Ger. *hürde*, a hurdle or wattled fence: Dan. *hyrde;* Ger. *herde*, a herd: F. *harde*, a herd of deer]: a collection or assemblage, as cattle or beasts; the rabble; in *Scot.*, one employed to attend cattle: V. to unite or associate, as beasts; to form into a herd. HERD'ING, imp. HERD'ED, pp. HERDER,

or HERDS'MAN, n. one employed in tending herds of cattle. HERDGROOM, n. in *OE.*, a keeper of herds.

HERDER, *hĕr'dĕr*, JOHANN GOTTFRIED VON: 1744–1803, Dec. 18, b. Mohrungen, near Königsberg, East Prussia: German writer. He studied philosophy at Königsberg under Kant, for whom he conceived an enthusiastic admiration, though subsequently he became one of his most resolute opponents. There also, he made the acquaintance of Hamann (q.v.), who first introduced him to the oriental languages and literatures, and made him appreciate the poetic beauty of the primitive civilizations. In 1764, having entered the clerical profession, he was appointed assistant prof. and preacher at the Cathedral School of Riga, where his sermons were greatly admired. Here he published his works, *Fragmente über die neuere Deutsche Literatur* (Fragments on the Recent German Literature, 1767), in which, with fiery vehemence, he attacked the wretched puerilities and errors of the national literature of the day, and the *Kritische Wälder* (lit. Critical Forests, 1769), formerly, though not now, of great theological importance. These two works contain the germs of all that is peculiar and characteristic in Herder's thinking. During a temporary residence at Strasburg Goethe made his acquaintance. The latter was five years younger than Herder, and, as yet, nameless in literature; while Herder, by his *Fragments*, was kindling with new fire the soul of Germany. Goethe almost worshipped him; he tells us (in his Autobiography) that the very handwriting of Herder exercised 'a magical influence' (*eine magische Gewalt*) over him. In 1775, on the recommendation of Goethe, he was invited to Wiemar by the grand-duke, and appointed court-preacher and consistorial councilor. Here he resided until his death. Herder's writings are very numerous, amounting to 60 vols. (Stuttg. 1827–30). They may be divided into three classes: (1) Those relating to religion and theology; (2) those relating to literature and art; (3) those relating to philosophy and history. As a theologian, his most important work is his *Geist der Hebr. Poesie* (Spirit of Hebrew Poetry, Dess. 1782; later edition, Leip. 1825; translated into English by Dr. James Marsh, 2 vols. Burlington 1833). As a philosopher, he has left a fund of valuable observation on nature and mankind. His philosophical masterpiece is his unfinished *Ideen zur Philosophie der Geschichte der Menschheit* (Ideas toward a Philosophy of the History of Mankind, 4 vols. Riga 1784–91; 4th ed., with Luden's Introduction, 2 vols. Leip. 1841; translated into English by T. Churchill under the title, *Outlines of a Philosophy of the History of Man*). In this work, all the rays of his genius converge. His aim is to represent the entire history of the race as a series of events pointing to a higher destiny than has yet been revealed. His love and reverence for humanity are intense, pure, passionate. An ideal humanity, it might almost be said, is his divinity, in whose service he labors with restless zeal. That enthusiasm, however, which made Herder so effective

as a mover of men's minds, had its damaging accompaniment in a deficiency of artistic excellence; his works are not remarkable for perfection of style or method. Among his works were *Gedichte, Volkslieder,* and the *Cid* (much admired by the Spaniards). In recent years there is a decided revival of interest in Herder and his writings. See Herder's *Lebenbild,* by his son 1846–7); works by Ziller, Thilo, Drobisch; Hildebrand's admirable essay in his work, *German Thought;* and Nevinson's *Sketch of Herder and His Times* (1884).

HERD'S GRASS (*Phleum pratense*), or TIMOTHY: one of the most valuable varieties of grass. In Penn. and the South Redtop (*Agrostis vulgaris*) is called Herd's Grass. Herd's Grass is said to be a native of Great Britain, where it is called Cat's-tail grass and is extensively cultivated. There are several traditions regarding its names. The most probable are that it was named from a farmer named Herd who introduced its culture in this country, and that it was called Timothy from Timothy Hanson, who sent its seed from New York to the South about 1750.

On account of its bulbous root Herd's Grass does not stand severe drought on light soils as well as some other grasses, and is not adapted to very close pasturage. But in rich soils it roots deeply and maintains itself many years. It is not entirely successful in the extreme South. At the North and West it has no superior for a hay crop. It is especially valuable for horses but, if cut early, is excellent for cows and sheep; yields heavy crops and contains a large proportion of nutritive matter. Seed may be sown in early autumn or in spring. It is frequently sown with grain but separate seeding is preferable. The land should be made rich, and the surface soil finely pulverized. From 12 to 20 quarts of seed per acre are sown. Heavy seeding gives the best quality of hay. Other grasses are usually, and profitably, sown with Herd's Grass both for hay and for pasturage. For hay, it should be cut when the stem, near the ground, begins to turn yellow. If it stands too long the stem becomes woody and indigestible, and the nitrogenous matter is stored in the seed. On rich land 15 to 30 bushels of seed, weighing 44 lbs. per bushel, may be obtained per acre.

HERE, ad. *hēr* [Ger. and Dut. *hier;* Icel. *her;* Sw. *här*]: in this place; in the present state or life. HERE AND THERE, in a dispersed manner; thinly. NEITHER HERE NOR THERE, neither in this place nor in that; of no importance. HERE, or HERE'S, a word used as an introduction to the drinking of a health, and to call attention to the fact that such is about to be done, as well as to the person who is about to do it, as *here's to you*—that is, 'it is to you,' or 'it is in your honor;' a word used in calling to, or making an offer, as '*here's* my hand,' 'come *here,*' '*here* goes.' HERE'ABOUT, ad., or HERE'ABOUTS, ad. about this place HEREAF'TER, ad in time to come: N. a future state. HEREAT', ad. at this. HEREBY', ad. by this.

HEREIN, ad. in this. HEREOF′, ad. of or from this. HEREON′, ad. on this. HERETO′, ad. *-tō′*, to this; add to this. HERETOFORE′, ad. *-tŏfōr′*, hitherto; formerly. HEREUNTO′, ad. *-ŭn-tō′*, to this. HEREUPON′, ad. *-ŭp-ŏn′*, on this. HEREWITH′, ad. with this.

HÉRÉDIA, JOSÉ MARIA, Spanish-American poet: b. Santiago de Cuba, 1803, Dec. 31; d. Toluca, Mexico, 1839, May 7. He was graduated from the law department of the University of Havana in 1819; for taking part in the attempted revolution of 1823 was banished from Cuba, lived for two years in the United States, and in 1825 removed to Mexico, where he held various civil, judicial, and journalistic positions. His poetic works have been to some extent rendered into other languages. The *Ode to Niagara* is well known. Heredia has been considered by many the greatest of Spanish-American poets. One of the best editions is that of Ponce de Leon *Obras Poeticas de Don José Maria de Heredia* (1875).

HÉRÉDIA, JOSÉ MARIA de, *drā-dē′â yō′sā mâ′rē′â:* French academician and poet of Spanish-American birth; 1842–1905 (Oct 3), b. at Fortuna, near Santiago, Cuba; d. in Paris. His first cousin bearing the same name (1803–39), is considered the greatest of Spanish-American poets, among well-known verse being his celebrated *Ode to Niagara.* Heredia at 8 years of age was taken to France and recived his early education at Senlis, at 18 studied for a year at the univ. of Havana, and returning to France entered the Ecole des Chartes. On leaving college he engaged in literary journalism, and became one of the most brilliant of the group of young poets forming the 'Parnassian' school founded by Leconte de Lisle. He exhibited an impeccable technic and a powerful originality, especially in his sonnets, which were distinguished beyond those of his contemporaries by sonorous rhythm and gorgeous coloring, exhibiting a thorough command of the French language, combined with the stately diction and exuberant fancy of Spain. These were published in one volume (1893) as *Les Trophées* (*The Trophies,* Engl. tr. in blank verse by F. Sewall, Boston. 1900), represent all human history, from antiquity, passing through the middle ages and the renaissance period in miniatures of delicate, yet powerful beauty, each sonnet illustrating an epoch. Quality and not quantity was the characteristic of his work; his prose writings include translations from the Spanish into French of *La Veridique Histoire de la Conquete de la Nouvelle Espagne de Bernal Diaz del Castillo* (1877–87); and the picaroon romance *La nonne Alferez.* Following the publication of *Les Trophées* in 1894, Heredia was elected member of the French Academy, and in 1901 succeeded Henri de Bormer as administrator of the Arsenal Library.

HEREDIPETY, n. *hĕr′ĕ-dĭp′ĕ-tĭ* [L. *hærēs,* an heir, *hærēdīs,* of an heir; *pĕtō,* I seek]: legacy-hunting.

HEREDITABLE, a. *hĕ-rĕd′ĭ-tă-bl* [L. *heredĭtas,* heirship, an inheritance—from *hērēs,* an heir: F. *hérédité,* heirship]:

that may be inherited HERED'ITABLY, ad. *-blĭ*. HEREDITA-MENT, n. *hĕr'ĕ-dĭt'a-mĕnt*, any species of property that may be inherited; sometimes divided into corporeal hereditament (houses and lands), and incorporeal (various rights). HEREDITARY, a. *hĕ-rĕd'ĭ-ter-ĭ*, that has descended from an ancestor; that may descend from an ancestor; that may be transmitted from parent to offspring. HEREDITARY RIGHT, strictly, the right of succession as an heir-at-law; its foundation is nothing but convenience, the principle being, that if a man does not by will appoint his own heir, the law will do it for him; and the law, in doing this, proceeds according to certain degrees of relationship. Hereditary right thus is not divine, or superior to that which results from the radical right of ownership: it is a secondary and substitutional right, the principal and primary right being that by which the owner of the land is entitled to say who shall at his death enjoy that land. HERED'ITARILY, ad. *-ĭ-lĭ*. HERED'ITY, n. *-ĭ-tĭ*, or HEREDITARINESS, or HERED'ITARY TRANSMISSION, scientific name for the law 'that each plant or animal produces others of like kind with itself': see HEREDITY.

HERED'ITARY PRIV'ILEGES AND POSSES'SIONS: rights and possessions transmitted from ancestors. The question of the admissibility of these has been much agitated with regard to three points, especially in recent times. The first is hereditary monarchy. The 'divine' right of kings is now little urged, being felt incompatible with modern notions of the political relations of society; and the defense of the hereditary transmission of the supreme power of the state is rested rather on the ground of political expediency and necessity. The animosities and disturbances of public affairs that attend the ever-recurring election of a head of the state are avoided, it is argued, by making power hereditary in a particular family, and by a determinate law of succession; while the dangers and disadvantages which might arise from an authority depending on the chance of birth, are capable of being neutralized by institutions which prevent the monarch from doing harm, even if there were not every reason to hope that self-interest will lead him to use the power which is the birthright of his family, for the permanent honor and advantage of that family, and, therefore, of the community with which it is indissolubly bound up.

Another and perhaps more difficult aspect of the question is with regard to hereditary classes, dignities, and offices in the state beside the hereditary monarch. One thing is now agreed upon in all countries of an advanced civilization, that the transmission in individual families of dignities, rights, and offices, involving essential parts of government —such as the supreme dispensation of justice, and other attributes of sovereignty—is inconsistent with the very idea of a state. The splitting up of Germany into a maze of petty sovereignties arising out of fiefs of the empire become hereditary, is a signal historic instance of the dangers of this principle. A hereditary nobility with such rights

is no longer considered defensible. It is another question whether, as a political institution, a class with certain hereditary privileges may not be advantageous or even necessary as an element of stability, and as affording a source of trained statesmanship. Society has a longer life than the individuals that compose it, and should have further-stretching views—'looking before and after;' and it is argued that chiefly in the great historical families of a nation, such extended views grow up and are cherished—families whose traditions form part of the national history, and which naturally identify their future with the national prosperity and dignity. It is claimed that besides their traditions and well-developed national instincts, the individual members of such families have other advantages as political and social leaders. Their usually good education, and their well-secured possessions which, in addition to a high sense of honor, raise them above having recourse to petty shifts and jobs, make them valuable as examples and as administrators in a commonwealth which aims at dignity and stability. Carried to an extreme length, as in France prior to the great revolution, the hereditary privileges of the nobility are a source of social discontent and disorder; but limited as in the United Kingdom, hereditary privileges and dignities are in that country considered in no way incompatible with the utmost social expansion, and are in reality so popular as to be admittedly a happy feature in the structure of society. It is further claimed, that as great families with privileges and titles are from time to time dying out, while others, through distinguished public services, are raised to the rank of nobility, that degree of infusion of new blood is kept up which gives vigor to the system, and at least prevents the British aristocracy from degenerating into an effete or antiquated caste.

In the United States, the aristocratic as well as the monarchial view is discarded; and the republican theory is so administered as to prevent any official dignity or function from being claimed by any person as a hereditary right or privilege.—As regards the economic view of hereditary right to private property, see J. S. Mill's *PoliticalEconomy*.

HERED'ITY: tendency in an animal or plant to resemble its parents in all essential characteristics, bodily or mental. The tendency in the offspring is to be of the same species, and even of the same variety as the parents, though always with minute differences. The influence of parents on the qualities of their offsprings is universally admitted, but the relative amount of influence from each parent is still an open question.

The general structure of the body, the height, the degree of development of the bones and muscles, the tendency to obesity or leanness, etc., seem to depend as frequently on one parent as on the other, in the case of man; but in many animals, as the dog, horse, etc., the father most frequently determines the general form and the size of the body.

The color and complexion of the offspring follow no

definite rule. Sometimes the colors of the two parents appear undiluted in the offspring, as in the case of a piebald colt, resulting from the union of a bay stallion and a white mare; in other cases an intermediate tint appears in the young. In the offspring resulting from the union of individuals of the dark and white human races, this intermediate tint is developed.

A very curious department of this subject is the transmission to the offspring of special marks or deformities exhibited by one of the parents or more remote ancestors, and not common to the species. Nævus (or mother's marks), moles, harelip, growths of hair in unusual places, an unusual number of fingers or toes, and special malformations of the heart and other organs, have been frequently traced to hereditary influence. These peculiarities have a tendency to show themselves in alternate generations, or even at greater intervals (see ATAVISM). Burdach, Blumenbach and some other physiologists, have held the doctrine, that parents (whether animals or men) who had suffered accidental or intentional mutilation of certain parts (e.g., the tail, fingers, etc), often produce offspring which inherit these deficiencies; e.g., dogs with cropped tails often produce pups with cropped tails. The facts are otherwise, however. The immemorial practice of the Chinese in stunting the feet of their women, has not produced a natural variety with that peculiarity.

Morell, in *Introduction to Mental Philosophy*, observes that there are latent powers or tendencies which have been inherited, and which often remain unknown until brought out by peculiar circumstances. He gives the familiar example of the pointer. The habit of pointing at game is originally an acquired one; but so strongly does this habit become seated in the race, that the very first time the young pointer is taken into the field, he will stand and mark it, thus developing a purely hereditary instinct. 'Exactly in the same way,' he adds, 'we find in man peculiarities of mind, temper, thought, habit, volition, etc., appearing and reappearing in families and races. Lord Brougham found some of his grandfather's writing exactly resembling his own, though the grandfather had died before he was born, and his father's was quite different.' It is alleged that the children of skilled artisans are, as a rule, more apt at petty manipulations than the children of ordinary laborers, and that hence the population of certain towns —Birmingham, for example—has a great advantage over that of other towns in point of manufacturing industry.

It is well-known that longevity or the reverse, a tendency to great frutifulness or to sterility, peculiarities in the degree of delicacy in the external senses, and possibly a special tendency to certain diseases are frequently transmitted in hereditary descent from one or other parent to the offspring. The predisposition to certain diseases may, it is thought, be transmitted by either parent, and where both parents have been affected, the offspring are believed to be especially liable to it.

The modern theory of the nature of heredity is that it rests upon a physical basis, which is the nucleus of the germinal cell—in all plants or animals which do not reproduce by parthenogenesis, the combined nuclei of two cells, the male and the female. As all the cells in the animal or plant are derived by fission from the original cell produced by fusion of conjugation of the ovum and sperm cell, it follows that each and every cell in the organism must have a part of the substance of each of the two original cells from which it was derived. This physical basis of heredity, the idioplasm it is called, is probably contained in the chromatin bodies of the nucleus of the germinal cell. It carries with it throughout the successive divisions of the fertilized ovum, the power of impressing its distinctive character upon the newly formed cells and of directing their energies along lines in general parallel with those followed by the cells of the parents. It is the inherent characteristics, as to color of skin, hair, and eyes, shape of features and of body, mental traits, diatheses, etc., that are transmitted by heredity—not acquired characteristics. The germ cell at the birth of the individual contains the idioplasm endowed with all the potentialities of form and character which will later distinguish this individual, and this endowment is not affected by mutilations of body or eccentricities of mind which may through force of circumstances be later acquired. Hence acquired traits or deformities—such as the small feet of the Chinese women, above referred to—are not transmitted to the progeny—are not inherited, in other words.

HEREFORD, *hĕr′ē-fȯrd:* city, parliamentary and municipal borough, cap. of the county of Hereford (Herefordshire), in the fertile and highly cultivated valley of the Wye, 134 m. w.n.w. of London. The principal building is the cathedral, a noble edifice, which, after having been substantially restored, was reopened 1863. St. James's church, built 1868, is an ornament to the city. A very interesting old map of the world, said to date from the 13th c., and other geographical works, are deposited in the chapter-house and library. Besides many other public buildings, Hereford contains numerous benevolent and educational institutions, among the later of which are several important free schools. Its manufactures are inconsiderable; gloves, hats, and flannel are the chief. Of its 5 annual fairs, that in Oct. is perhaps the largest in the county. Hereford returns one member to parliament. Pop. (1901) 21,382.

HEREROLAND: see DAMARALAND: OVAMPOS—OVAMPOLAND.

HERESY, n. *hĕr′ĕ-sĭ* [F. *hérésie*—from Gr. *hairĕsĭs*, L. *hærĕsĭs*, a set of principles, heresy—from Gr. *hairĕō*, I take, I choose]: untenable or unsound opinion or doctrine; religious opinion opposed to Scripture, as interpreted by the authorized doctrinal standard of any particular church. HER′ETIC, n. *-tĭk* [Gr. *hairĕtĭkŏs*, heretical]: one who holds

opinions contrary to those generally received or taught. HERETICAL, a. *hĕ-rĕt'ĭ-kăl*, contrary to the true or established faith; erroneous. HERET'ICALLY, ad. *-lĭ*. HERESIARCH, n. *hĕr'ĭ-sĭ-ârk* [Gr. *archos*, chief]: a leader in heresy; the founder of a sect of heretics. HER'ESIAR'CHY, n. *-âr'kĭ*, chief heresy. HER'ESIOG'RAPHER, n. *-ŏg'ră-fĕr*, one who writes on heresies. HER'ESIOG'RAPHY, n. *-ŏg'ră-fĭ* [Gr. *graphō*, I write]: a treatise on heresies. HERESIOL'OGIST, n. *-ŏl'o-jĭst*, one who applies himself to the study of the history of heresy. HERESIOL'OGY, n. *-jĭ*, comprehensive history of heresy.—SYN. of 'heresy': heterodoxy; schism; sectarianism.

HER'ESY: term applied to religious belief, denoting the act of choosing for one's self, and maintaining opinions contrary to the authorized teaching of the religious community; denoting also the heterodox opinions thus adopted, and the party which may have adopted them. In Acts v. 17; xv. 5; xxiv. 5; xxviii. 22, the word seems to be used of a sect or party, abstracting from the consideration of its character whether good or bad; but in the Epistles and in the early Christian writers it is almost invariably used in a bad sense, which is the sense uniformly accepted in all subsequent theological literature. The notion of heresy, as understood by theological writers, involves two ideas: first, the deliberate and voluntary rejection of some doctrine proposed by the supreme authority established in any church as necessary to be believed; secondly, a contumacious persistence in such rejection, with the knowledge that the belief of the doctrine is required of all the members of that particular religious community. Rom. Cath. writers, regarding the authority of their own church as supreme and final, apply the name heresy to any formal denial of a doctrine proposed by the Rom. Cath. Church as necessary to be believed. Protestant writers seldom use the word, except in relation to what each sect regards as the essentials of Christian faith. Beyond this point, indeed, the idea of heresy has no proper place in the dogmatical system of the Prot. sects, especially in reference to other communions than their own. In the Rom. Cath. Church, the supreme authority may be either the decree of a general council approved by the pope, or a dogmatical decree of the pope himself, expressly or tacitly received by the bishops of the various churches; and in general the charge of heresy is incurred in any church by the rejection of a doctrine which in that church is held to constitute an essential and integral portion of the Christian faith. Apostasy is the complete abandonment of the whole Christian doctrine, and the renunciation of the Christian profession. If the intellectual error be accompanied by full deliberation, and by full knowledge of the motives of belief, the heresy is called *formal;* should it arise from ignorance or imperfect knowledge, it is styled *material;* and the heresy is held to be imputable, or the contrary, according as this ignorance is vincible or invincible.

Even in the apostolic times, heresies had arisen in the

church; and before the council of Nice, the catalogue of sects had already swelled to considerable dimensions. Without attempting any enumeration of these heresies, it may be said in general that the sects of the early centuries are all reducible to two classes: (1) Those which attempted to associate the Christian doctrine with Judaism; (2) Those which ingrafted Christianity upon the Gentile religions or the Gentile philosophies. And this latter class naturally subdivides itself into (1) The sects which were tinged with the errors of the oriental philosophy; (2) Those which drew their errors from the Grecian schools. Of all these we find traces, more or less distinctly marked, in the sects of later ages.

From the very date of the establishment of Christianity in the Roman empire, heresy appears to have been regarded as a crime cognizable by the civil law; and Constantine enacted several severe laws for its repression, which were continued and extended by his successors, and were collected into a single title, *De Hœreticis*, in the Justinian code. The penalties of heresy ordained by these enactments are very severe, extending to corporal punishment, and even to death; and they all proceed on the distinct assumption that a crime against religion is a crime against the state. These enactments of the Roman law were embodied in the various codes of the European kingdoms; and in considering the history of the middle ages, it is necessary to recollect that the principle above referred to, as to the social bearing of the crime of heresy and of other crimes against religion, pervades the whole system of mediæval jurisprudence. It is further to be remembered, that the principles of many of the mediæval sects were anti-social and communistical, as well as opposed to the doctrines of the church; and that their leaders, in many instances, by adopting violent and revolutionary means for the propagation of their doctrines, drew upon themselves the punishment of anarchy and rebellion, as well as of heterodoxy in religion. Still, with even these allowances, Rom. Cath historians themselves admit that the mediæval procedures against heresy were in many instances excessive, as were, indeed, also the processes and penalties of the criminal code.

In English Law (2 Hen. IV. c. 15), heresy consisted in holding opinions contrary to what was known as Catholic faith and the determination of Holy Church; and by common law the offender was to be tried in the provincial synod by the archbishop and his council; and, after conviction, was to be given up to the king to be dealt with at his pleasure, the king being competent to issue a writ *de hæretico comburendo;* but the statute above referred to empowered the diocesan to take cognizance of heresy, and on conviction to hand over the criminal directly, and without waiting for the king's writ, to the sheriff-major or other competent officer. This statute continued practically in force, with certain modifications, till the 29 Charles II. c 9 since which time heresy is left entirely to the cognizance of

the ecclesiastical courts; but, as there is no statute defining in what heresy consists, and as, moreover, much of the jurisdiction of the ecclesiastical courts has been withdrawn by the various toleration acts; and, above all, as the effect of various recent decisions has been to widen almost indefinitely the construction of the doctrinal formularies of the English Church, it may now be said that the jurisdiction of these courts in matters of heresy is practically limited to preventing ministers of the Established Church from preaching in opposition to the doctrine and the articles of the establishment from which they derive their emoluments, and that, even in determining what is to be considered contrary to the articles, a large toleration has been juridically established. See the case of Dr. Rowland Williams and other trials in connection with the *Essays and Reviews*, as well as more recent cases.

It is evident that the term heresy has a vague and varying meaning, according to the period, the place, and the circumstances in which it is used. It does not necessarily involve rejection of the common Christianity, especially in modern days; being applied sometimes in pious panic, or in an excess of doctrinal zeal. The heresies that invaded the early church seem, however, in most cases to have been properly so called.

Beside the heresies in the Christian Church, there are numerous sects and heresies among Mohammedans and Buddhists.

For the history and literature of heretical sects, consult the very numerous articles in this work on the various bodies of heretics, as MANICHÆANS; GNOSTICS; ALBIGENSES; etc.; the standard ecclesiastical historians; also Stockmann's *Lexicon Hæresium* (1719); De Cæsari's *Hæresiologia* (1736); Arnold's *Ketzerhistorie* (1699); and like works by Walch, Fritz, and Hilger.

HERFORD, *hĕr'fōrt:* town of Prussia, province of Westphalia, close to the frontier of Lippe-Detmold, on the Werre, 17 m. s.w. of Minden Yarn-spinning, linen-weaving, and carpet manufactures are carried on Pop. 25,100.

HERI, *hĕr'ē*, or HERI-RUD, *hĕr'ē-rôd*, or HURI: river of central Asia, rising in the Hindu Kush Mountains, about 150 m. w. from Cabul. It flows w. through Afghanistan, more than 300 m. through a fertile and beautiful valley, in which stands the city of Herat (q.v.); then bending suddenly n. along the boundary between Persia and Turkestan, and afterward n.w. through Turkestan, it has a further course of fully 400 m., till it terminates in the swamp of Tejend, 150 m. e. of the Caspian Sea. After entering Turkestan, the Heri soon begins to lose its water in the sand of the desert, and the latter part of its course for hundreds of miles is dry, except at certain seasons of the year.

HERING, EWALD, German psychologist: b. Altgersdorf, Saxony, 1834, Aug. 5. He studied medicine, and settled at

Leipsic as physician in 1860; in 1862 he was lecturer in physiology at the Leipsic University, and in 1865 was professor of physiology and medico-physics in a medical school at Vienna, and in 1870 held the same chair at Prague. Hering is best known for his work in the field of psychophysics, especially for his investigations of visual space perception and for the color theory which he originated. This theory is opposed to the empiristic theory of Helmholtz and is most generally accepted by psychologists at the present time. His writings include: *Die Lehre vom Binocularen Sehen* (1860); *Zur Lehre vom Lichtsinne* (1872–4); *Der Raumsinn und die Bewegung des Auges; Das Gedachtniss als eine allgemeine Funktion der organisierten Materie* (1870).

HER'ING, Rudolph, American hydraulic and sanitary engineer: b. Philadelphia, Pa, 1847, Feb. 26. He was graduated at the Dresden (Germany) Polytechnic School, 1867, and became assistant engineer of Prospect Park, Brooklyn, N. Y., the following year. He was assistant engineer of Fairmount Park, at Philadelphia, 1869–71, and astronomer at Yellowstone National Park in 1872. After serving as assistant city engineer 1873–80 he opened an office for private practice in engineering and has furnished designs for sewerage and water supply for numerous towns and cities in the United States, Canada, and South America. He is member of many professional societies both in Europe and America, and has written many published reports on sewerage and water supply of cities.

HERIOT, n. *hĕr'ĭ-ŏt* [AS. *heregeatwa*, a warlike implement, what was given to the lord of the manor to prepare for war—from *here*, an army; *geatwe*, a provision, a treasure]: in *English law*, primarily a tribute to the lord of the manor to assist his preparation for war: a tribute or fine payable in copy-hold estates to the lord of the manor on the death of the landholder or vassal: the right of heriot is now practically unknown in free-hold estates in England. Her'iotable, a. *-ŏ-tă-bl*, subject to a tribute or fine.

HERIOT, *hĕr'ĭ-ot*, George: founder of a magnificent hospital at Edinburgh, the son of a goldsmith in that city, a descendant of the Heriots of Trabroun, East Lothian, was born 1563, June. Admitted, 1588, May, a member of the Edinburgh Incorporation of Goldsmiths, he was, in 1597, appointed goldsmith to Anne of Denmark, consort of James VI. of Scotland, and soon after to the king on whose accession, in 1603, to the English throne Heriot went to London, where, as a court-jeweller and banker, he amassed considerable riches. He died 1624, Feb. 12, without issue, and bequeathed the greater part of his wealth (£23,625) to the town-council and ministers of Edinburgh, to found and endow a hospital in that city for the maintenance and education of the sons of poor deceased or decayed burgesses. The noble structure of Heriot's Hospital, from a design, it is believed, by Inigo Jones, was completed, in 1649, at a cost of £30,000. Next year Cromwell

made it a military hospital; but in 1659, 30 boys were admitted. In 1885, above 200 boys were maintained and educated in it, half of whom were non-resident. In 1837 an act of parliament was procured for the erection of free schools for poor children (ultimately 16 in all) The scheme of the Educational Endowment Commissioners, embodied in an act of 1885, reconstituted the Hospital and closed the free schools. The act provided that the Hospital should cease to exist as such a year after the date of the act, and that 120 foundationers (orphans and fatherless children of Edinburgh burgesses) should henceforward be boarded out. A new Hospital School takes the place of the Hospital; and in it are to be taught to the foundationers and outdoor pupils mathematics, drawing, science, and modern languages, while laboratory and workshop training is also given. Instead of the free schools, a sum of £3,500 is to be spent in paying fees for poor children at public schools. Bursaries for deserving pupils open the way to the High School and the University. The Watt Institution is to become the Heriot-Watt Institution, and be subsidized from the Heriot funds, to provide for older students thorough scientific instruction in evening classes at moderate fees; with powers to constitute a day college for higher technical education. Upwards of 20 lecturers teach science and languages. In 1884, the annual revenue of the Hospital was above £25,000.

HERISAU, *hā'rē-sow:* town of Switzerland, canton of Appenzell, cap. of the Outer Rhodes, at the junction of the Glatt and Brühlbach rivers, 7 m. n.w. of Appenzell, 2,550 ft. above the sea. It contains a church with a tower supposed to have been built in the 7th c., public library, town-house, arsenal, poor-house, casino, hospital; manufacturies of muslin, cotton, and silk; tanneries, bleacheries, paper-mills, and dye-works; beautiful walks and gardens, and on the surrounding heights the ancient castles of Rosenberg and Schwäneberg. The famous baths and goat's-whey cure of Heinrichsbad are about a m. distant. Herisau was settled by the Romans; Christianity was introduced early in the 7th c.; and the people purchased their freedom from the jurisdiction of the abbots of St. Gall 1463. Pop. about 13,500.

HERISTAL, *hĕr'ĭs-tâl,* or HERSTAL, *hĕrs'tâl:* village of Belgium, province of Liege, extending along the left bank of the Maas about three m., immediately below the city of Liege, of which it may almost be considered a suburb. The people find employment in the coal-mines, the iron and steel-works, which are here carried on. Some ruins remain of the castle of Heristal, the birthplace of Pepin le Gros (father of Charles Martel, and great-grandfather of Charlemagne), and from which he had his title of Pepin d'Heristal. Pop. 18,200.

HERITABLE, a. *hĕr'ĭ-tă-bl* [L. *hærēs,* an heir, *hærēdĭs,* of an heir; *heredĭtārĕ,* to inherit]: that may or can be inherited; that passes to the heir; in *Scotch law, heritable* and

movable distinguish things which go respectively to the heir and to the executors. HERITABLE BOND, in *Scotch law*, a bond for a sum of money, and with it a conveyance of land in security thereof. HERITABLE SECURITIES, in *Scotch law*, mortgages and charges on land. HER'ITAGE, n. *-ĭ-tāj* [F.]: an estate which passes from an ancestor to an heir; in *Scrip.*, those whom God adopts. HERITOR, n. *hĕr'ĭ-tėr*, in *Scot.*, a landholder in a parish, liable to public burdens: the heritors collectively are vested with the fee of the church and churchyard.

HER'ITABLE JURISDIC'TIONS: remarkable class of jurisdictions held hereditarily from the crown in Scotland, abolished (1748) by 20 Geo. II. c. 43. These jurisdictions, numbering more than a hundred, consisted of sheriffships, stewartries, constabularies, but principally of regalities and bailieries, with some offices of distinction. One of the more important was the office of lord justice-general, and the lordship of Argyle and the Isles, both belonging to the family of Argyle. In virtue of their hereditary rights, the possessors of these jurisdictions exercised an arbitrary power over vassals and others within their domain, and could punish them by fines, scourging, imprisonment, and even in some cases put them to death, without interference of the common law. The legislative act abolishing these odious jurisdictions, followed by the appointment of sheriffs on a proper footing, marks an important era in the history of Scotland.

HERKIMER, *hėr'kĭ-mėr* (Ger. HERCHHEIMER), NICHOLAS: about 1715–1777, Aug. 16; b. in the present Herkimer co., N. Y.: soldier. He was elected a lieut. of militia when 30 years old, was in command at Fort Herkimer on the Mohawk (site of German Flats, N. Y.) during the combined French and Indian attack 1758, became col. of militia in Tryon co. 1775, and brig.gen. 1776; led an expedition against the tories and Indian allies under Sir John Johnson 1776; and was ambuscaded by the British and Indians in a wooded ravine near Oriskany, defeated, and wounded while conducting an expedition to the relief of Fort Stanwix (Rome, N. Y.), then besieged by Col. St. Leger. He died at his home from unskillful amputation. Congress voted him a monument 1777, Oct., but it was not till 1884 that the memorial was erected, and then chiefly through the efforts of the Oneida Hist. Soc. It cost $17,000, of which the federal govt. gave $4,000, the state of N. Y. $3,000, and citizens $10,000.

HERKIMER, N. Y., village, county-seat of Herkimer County; on the Mohawk River, the Erie Canal, and on the New York C. & H. R. railroad; about 25 miles east of Utica and 68 miles northwest of Albany. The chief manufactures are flour, furniture, mattresses, knit goods, beds, paper, creamery products, and cigars. The city owns and operates the electric plant and the waterworks. It is the seat of Folts Mission Institute. Pop. (1910) 7,520.

HERKOMER, *hėr'ko-mėr*, HUBERT: painter: b. Waal, Bavaria, 1849, May 26; son of a skilful wood-carver who

emigrated to the United States 1851 and six years afterward settled in Southampton, England. Herkomer entered the Southampton Art School 1862, and won a bronze medal; accompanied his father to Munich 1865, studied art a year with Prof. Echter, entered the South Kensington School 1866, and the same year aided in founding a drawing school for the study of living models. In 1867 he exhibited in the Dudley Gallery. From this time he gradually gained recognition as a painter in water colors, and in 1871 was elected a member of the Institute of Water Color Painters. His first picture exhibited at the Royal Academy, *After the Toil of the Day* (1873), a German subject, attracted attention; and two years later he gained a great reputation by his famous picture representing *The Last Muster—Sunday at the Royal Hospital, Chelsea*, to which a grand medal of honor was awarded at Paris 1878. Later pictures are: *Eventide: a Scene in Westminster Union* (1878), a worthy companion of the other realistic yet more heroic study of old age, which the artist made in his 'Chelsea Pensioners;' *Missing: a scene at the Portsmouth Dockyard Gates* (1881), a masterpiece in its way; *On Strike* (1891), his diploma work; *Back to Life: a District Nurse Taking out a Child for the First Walk after a Long Illness* (1896); and *The Guards' Cheer* (1898), representing a scene in the Diamond Jubilee procession. Among many other portraits painted by him the best known are those of Wagner, Ruskin, and Tennyson. His best water-color pictures are: *Im Walde; The Woodcutter's Rest; The Poacher's Fate;* and *At the Well.* Mr. Herkomer was elected associate of the Royal Academy in 1879, and full member in 1890, and from 1885 till 1895 held the Slade professorship of fine art at Oxford in succession to Mr. Ruskin. He holds a life professorship at Munich, superintends an art school founded by himself at Bushey in Hertfordshire, and for the theatre connected with it has written several plays. Herkomer also occupies a high place as an etcher and mezzotint engraver. He has published: *Lectures on Etching and Mezzotint Engraving* (1892). See Courtney, *Life* (1892).

HERMÆ, n. plu. *hėr'mē* [L. and Gr. *Hĕrmēs*, Mercury]: heads carved on the top of a square pedestal or post diminishing toward the base, used to mark the boundaries of land. See HERMES.

HERMANDAD, *ār-mân-dâth'*, THE (Sp. 'Brotherhood'): association of the principal cities of Castile and Aragon, bound together by a solemn league and covenant for the defense of their liberties in seasons of trouble. These confederacies were sanctioned by the sovereigns, as agents for suppressing the increasing power of the nobles, and for maintaining public security through the land with no cost to the government. In Aragon, the first Hermandad was established in the middle of the 13th c., and in Castile about 30 years later. In 1295, 35 cities of Castile and Leon formed a joint confederacy, and entered into a compact, pledging themselves to take summary vengeance on every

noble who had either robbed or injured a member of their association and refused to make just atonement for the wrong; or on any one who should attempt, even by the order of the king, to levy an unjust tax. During the long anarchy in which the Christian rulers of Spain were impotent to maintain order in their own dominions, the *Santa Hermandad,* or Holy Brotherhood, had presented the only check against the unbounded license of the nobles. The crimes reserved for its jurisdiction were all acts of violence and theft committed on the highroads or in the open country, and the penalties attached to each misdemeanor were specified with the greatest precision in the codes of laws enacted at different times in the yearly assemblies of the deputies of the confederate cities. An annual contribution was. moreover, assessed on every hundred householders or *vecinos,* for the equipment and maintenance of the horsemen and *quadrilleros* or officials of the brotherhood, whose duty it was to arrest offenders, and enforce the sentence of the law. Although the Hermandad was regarded with much disfavor by the aristocracy, it continued for many years to exercise its functions, until the country was cleared of banditti, and the ministers of justice enabled to discharge their duties without hindrance. In 1498, the objects of the Hermandad having been obtained, the brotherhood was reduced to an ordinary police. See Mariana, *History of Spain;* Pulgar, *Reyes Catolicos;* Prescott, *History of Ferdinand and Isabella.*

HERMANN, or HERMAN, *hēr'mân* [Lat. *Arminius*]: name that first appeared in Germany in the 6th c. after Christ, but is now become common. It has been erroneously transferred to that prince or chief of the Cherusci, called by Roman writers Arminius, and by the Greeks Armenios. This personage was b. B.C. 16; d. A.D. 21; son of Sigimer. The period in which the youth of Hermann was cast was fraught with the greatest peril to Germany. To secure the frontiers of the empire against the attacks of the Germanic tribes, the Romans had been forced to advance into the more turbulent districts, and to build a series of forts to overawe the inhabitants. In this manner, not only had most of the Celtic tribes from the Alps to the Danube been subdued, but during B.C. 9—A.D. 4, Drusus and Tiberius had penetrated into the N.W. of Germany as far as the Elbe, laid out a number of military roads, erected fortresses in the country, and reduced the different tribes to such dependence upon Rome, as virtually amounted to complete subjugation. With so much prudence and caution had Tiberius proceeded that the Germans continued to all appearance on the best terms with the Romans, gradually adopted Roman habits, and frequently and readily took service in the Roman armies. Thus Hermann and his brother Flavius had enrolled themselves under the Roman standards, and as leaders of Cheruscan auxiliaries, had not only obtained Roman citizenship and the rank of knighthood in the country of the Danube, but had likewise acquired a knowledge of the Latin language, and a

deep insight into the arts of war and policy as practiced by the Romans. Enriched with these experiences, when Hermann, after the expiration of some years, returned home, he found the state of affairs considerably changed for the worse, through the unskilful despotism of the Roman viceroy, Quintilius Varus. Hermann now conceived the plan of delivering his country from its oppressors. All the tribes and leaders at far as the Elbe were secretly summoned; Varus was lulled into security, and induced to dispatch portions of his army to different points, and with the remaining portion, which was just on the point of leaving the country of the Cherusci for the Rhine, to quit the highway. He was thus lured into the impassable districts of the *Teutobury Forest* (either in the upper valley of the Lippe, or the adjoining Prussian territory); an engagement took place, which lasted for three days. The result was the annihilation of the whole Roman army (A.D. 9). When intelligence of this defeat reached Rome, it excited the greatest consternation and anxiety. The Germans, however, who had only their own liberation in view, prosecuted their victory no further; and for a few years both parties rested. When Germanicus (q.v.), however (A.D. 14), assumed command on the Lower Rhine, he resolved to crush the barbarians. In two successive campaigns, A.D. 14 and 16, he reduced Hermann to great straits; but Germanicus was recalled to Rome by Emperor Tiberius, A.D. 17, and the results of his victorious activity were lost. From this time no Roman army ever ventured to penetrate from the Rhine into the interior of Germany, and this fact, which decided the future for Germany, must be ascribed chiefly to Hermann. Nevertheless, no sooner was the foreign enemy expelled, than internal feuds broke out with more violence than ever. In the course of these, Hermann was slain by his own relatives, in the 37th year of his age and twelfth of his leadership. Tacitus says of him: 'He was, without doubt, the deliverer of Germany; and unlike other kings and generals, he attacked the Roman people, not at the commencement, but in the fulness of their power; in battles, he was not always successful, but he was invincible in war. He still lives in the songs of the barbarians, though unknown to the annals of the Greeks, who admire only what belongs to themselves; by the Romans, he is not estimated according to his merits, because in our admiration for the past we neglect the present.' Compare Wietersheim, *Der Feldzug des Germanicus* (Leip. 180); Massmann, *Arminius, Cheruscorum Dux ac Decus, Liberator Germaniæ* (1839); Böttger, *Hermann, der Cheruskerfürst* (Han. 1874). A colossal statue of Hermann, on a hill near the town of Detmold, was publicly unveiled 1875, Aug. 16. The work, intended to be a national monument, is by the sculpture Bandel, who devoted to it a large portion of his life.

HERMANN, Johann Gottfried Jakob: 1772, Nov. 28—1848, Dec. 31; b. Leipsic: German philologist. He studied at Leipsic and at Jena, and was made 1798,

extraordinary prof. of philosophy. In 1803, he was called to Kiel as ordinary prof. of eloquence, becoming in addition prof, of poetry 1809, and in this position he remained till his death. Distinguished by liberality of mind and love of truth, by eloquence and extensive culture, Hermann continued till his latest days to attract a large circle of students to his class-room, which sent forth some of the most celebrated teachers in the schools and universities of Germany. The first department which he began to cultivate on original principles was the science of metre, of which he attempted to develop a philosophical theory from the categories of Kant; and on this subject he wrote, besides *Handbuch d. Metrik* (1798), several Latin treatises, among which *Epitome Doctrinæ Metricæ* (1818) reached a third ed. 1852. Of wider importance, however, was the new method which he introduced into the treatment of Greek Grammar, which has had its influence on the grammar of Latin, and even of modern languages, especially of the German. The principles of this method are not only explicitly developed in *De Emendendâ Ratione Græcæ Grammaticæ* (1801), but are practically illustrated in his numerous editions of the ancient classics. Hermann's power of dealing with chronological, topographical, and personal questions, is shown in his *Opuscula* (7 vols., Leip. 1827–30), which also contain some poems breathing the spirit of Roman poetry. Consult Jahn's *Gottfried Hermann, eine Gedächtnissrede* (Leip. 1849).

HERMANN: Mo., a town in Roark Township, the capitol of Gasconade County, on the Mississippi River, and the Missouri Pacific R. R.; 81 miles west of St. Louis. It is in a grape-vine growing region and manufactures wine, beer, flour, tools and cigars. Pop. 1,700.

HERMANNSTADT, *hĕr'mân-stât* (Lat. *Cibinium*, Hung. *Nagy-Szeben*): important town of Hungary, formerly cap. of Transylvania, on an affluent of the Aluta, near the n. base of the Eastern Carpathians. Hermannstadt, originally a village, is called, on the ancient seal of the town, *Villa Hermanni*. The *Hermann* from whom the town has its name was a citizen of Nürnberg, and is said to have led hither a colony in the 12th century. Hermannstadt is the seat of a Greek archbishop. There is an upper town, lower town, and four suburbs. Tanning, wax-bleaching, and the making of cloth, combs, paper, candles, soap, and gunpowder, are the industries. Pop. 26,100.

HERMAPHRODITE, n. *hĕr-măf'rō-dīt* [Gr. *Hĕrmēs*, the god Mercury, as representing the male principle; *Aphrŏdīte*, the goddess Venus, as representing the female principle]: a living creature which is both a male and a female. In *bot.*, a plant whose flowers contain both the male and female organs of reproduction (stamen and pistils), and are therefore by themselves capable of producing perfect seed. Flowers containing only male or female organs are called *unisexual* or *Diclinous* (q.v.), and when produced on the same plant, *Monœcious* (q.v.); when on different plants, *Diœcious* (q.v.). Hemaphrodite flowers are also called

monoclinous [Gr. *monos*, one, and *klinē*, a couch], and *perfect* flowers. HERMAPHRODITE, a. designating both sexes. HERMAPH'RODIT'IC, a. *-dit'ik*, uniting in one body the character of both sexes. HERMAPH'RODIT'ICALLY, ad. *-li*. HERMAPH'RODE'ITY, n. *-dē'ĭ-tĭ*, being in the state of a hermaphrodite. HERMAPH'RODISM, n. *-rō-dĭzm*, or HERMAPH'RODITISM, n. *-dĭt-ĭzm*, state of being a hermaphrodite. HERMAPHRODITE BRIG: see BRIG—BRIGANTINE.

HERMAPH'RODITISM: state or condition of those organisms, animal or vegetable, in which the sexual characteristics of the male and female are united in the same individual. The name is derived from the fable of the union into one body of the bodies of Hermaphroditus, son of Hermes and Aphrodite, and the nymph Salmacis. See Ovid's *Metamorphoses*, lib iv. v. 347.

There are two kinds of H., the true and the spurious; in the former, there is actual co-existence, in the same individual of male and female reproductive organs; while in the latter, there is only an appearance, from arrest or excess of development, of a union of the distinctive organs of both sexes. True H. is the normal type of sexual structure in most plants: see HERMAPHRODITE, in Botany. It likewise occurs normally in many of the lower invertebrata, and as a monstrosity in the higher invertebrata, and even occasionally in certain vertebrata.

Recent investigations of Balbiani show that certain Infusoria (e.g., the common green Paramœcium), at all events occasionally present the phenomena of hermaphroditism. In some of the polyps (e.g., the Hydra and some of the Actiniæ), the sexes are united in the same individual; the same is the case with some of the Acalephæ (namely, the Ctenophora), with certain orders of Helminthes or parisitic worms (the Cestodes and Trematodes), with certain Annelides (the Hirudinei and Lumbricini, of which the leech and the earth-worm are typical examples), with many acephalous mollusks, with the Pteropods and with most of the Gasteropods; while in the highest order of mollusks, the Cephalopods, the sexes are always distinct. Among the crustaceans, the Cirrhipeds are mostly hermaphrodites; but in the other and higher orders, if H. exists, it is only abnormal, and gives rise to a monstrosity; e.g., the common lobster has been observed with male organs on one side of its body, and female organs on the other. True but not normal H. also is occasionally found in insects. In 14 cases given by Oehsenheimer, the right side was male, and the left female; in nine cases it was the reverse. Prof. Owen remarks that in insects hermaphrodites are occasionally found, where the characters of one sex, instead of extending over one half, are limited to particular parts of the body which agree in the main with the other sex. Thus, in an individual of *Gastrophaga quercus*, the body, the antennæ, and the left wings were those of the female, while the right wings were those of the male.

True (though abnormal) H. is far rarer among the vertebrata than in insects or crustaceans. Various instances, however, are on record of fishes presenting a lateral her-

maphroditic structure, or a roe on one side and a milt on the other; references to various cases reported are in Sir James Y. Simpson's learned and elaborate article, 'Hermaphroditism,' in *The Cyclopædia of Anatomy and Physiology;* see the same article for cases of similar H. in birds and mammals, including the human subject, namely, cases in which there were female structures on one side, and male structures (more or less perfect) on the other.

Returning from these cases of abnormal true H. to those of normal true H., the question naturally suggests itself—Can these true animal hermaphrodites, possessing male and female organs, fertilize themselves? As far as is known, none of the terrestrial hermaphrodites, such as land mollusks (e.g. the common snail) and earthworms, are self-impregnating. They all pair, and in this respect offer a strong contrast with hermaphrodite plants. But of aquatic animals, there are many self-fertilizing hermaphrodites. On the general subject, see further, Steenstrup's *Untersuchungen über das Vorkommen des Hermaphroditismus in der Natur* (1846).

Spurious H. is a subject of purely a professional character: see Sir James Y. Simpson's article (noted above); also case recorded a number of years ago by Dr. Girdwood in *The Lancet.*

HERMAS, *hĕr'mas,* SHEPHERD OF (i.e., a book called *The Pastor*, written by Hermas): name of a book much esteemed in the early church, as is evidenced in quotations from it by Irenæus, Clement of Alexandria, Origen, and other fathers. Beside two Greek copies (one in the Sinaitic manuscript, found 1859), we have two Latin translations. The book is commonly classed among writings of the apostolic fathers, The authorship has been variously ascribed; by some to Hermas, friend of the apostle Paul, mentioned Rom. xvi. 14; by others to several later writers. The most probable conjecture assigns the authorship to Hermas, brother of Pius who was bishop (pastor) of the church in Rome 139-154; and assigns its date to about 130.

The work contains many allusions which appear to be directed against the Montanistic errors—a fact irreconcilable with the supposition of its having been written in the apostolic age. *The Shepherd,* whichever H. may have been its author, seems to have been originally written in Greek. It is a mystical work, divided into three parts—the first containing four *Visions;* the second, twelve *Precepts;* and the third, ten *Similitudes.* It has been described by Dean Stanley as the *Pilgrim's Progress* of the early church; and though it contains little positive dogmatic teaching, is a most interesting monument of the Christian life of that early period.

HERMENEUTICS, n. plu. *hĕr'mĕ-nū'tĭks* [Gr. *hermeneu'tikos,* pert. to explanation—from *hĕrmēneus,* an interpreter—from *Hĕrmēs,* Mercury]: science of interpretation of any writings, particularly of Scripture. HER'MENEU'TIC, a. *-tĭk,* also HER'MENEU'TICAL, a. *-tĭ-kŭl,* interpreting; explanatory. HER'MENEU'TICALLY, ad. *-lĭ.*—*Hermeneutics*

forms a branch of the same general study with exegesis (q.v.), and indeed is often confounded with that science; but the distinction between the two branches is marked. To hermeneutics properly belongs the 'interpretation' of the text—that is, the *discovery* of its true meaning; the province of exegesis is the 'exposition' of the meaning so discovered, and the practical office of making it intelligible to others in its various bearings, scientific, literal, doctrinal, and moral. Hence, while (see EXEGESIS) the laws of interpretation have many things in common with those of exposition, to the especial province of hermeneutics belongs all that regards the text and interpretation of the Holy Scripture; the signification of words, the force and significance of idioms, the modification of the sense by the context, and the other details of philological and grammatical inquiry; the consideration of the character of the writer or the persons whom he addressed; of the circumstances in which he wrote, and the object to which his work was directed; the comparison of parallel passages; and similar considerations. All these considerations, although seemingly purely literary, are modified by the views entertained as to the text of Holy Scripture, and especially on the question of its inspiration, and the nature and degree of such inspiration.

So far, there is but little difference between Rom. Cath. hermeneutists and the more strict school of Prot. critics. At this point begins the fundamental distinction between the two. With Protestants, the sense of the Scripture once truly ascertained from the Scripture itself, interpreted by the rules explained above, is regarded as final, and is accepted by the interpreter as the revelation intended by God. With the Rom. Catholics, the individual judgment which is formed on these rules, and which, as to the actual meaning of the particular passage, may possibly coincide with that of the Prot., is still controlled, and, it may be, overruled by the authoritative interpretation of the church, as conveyed in the decrees of councils, or the dogmatical definitions of pontiffs accepted by the universal church. From this, it is often inferred that in the Rom. Cath. Church the science of hermeneutics is a nullity, and that no freedom of interpretation is practically permitted. The Rom. Cath. critic, however, maintains that he exercises, and is free to exercise, on the text of Scripture the same liberty of interpretation which the Prot. may claim; and that it is quite possible that he may arrive at precisely the same conclusions with the Prot. as to the meaning of *the scriptural text considered in itself alone.* But he differs from the Prot. in believing that the Scripture does not contain the whole of God's revelation, and, therefore, that, as one passage of Scripture is modified by another, so the scriptural revelation itself may be modified by other revelations of God conveyed to us through other mediums, e.g., tradition: see TRADITION. On a somewhat cognate subject, see DEVELOPMENT OF DOCTRINE. As regards the literature of Hermeneutics, most of the writers named in the article EXEGESIS have dealt with both branches of the science. They are mostly Prot. The

most remarkable modern Rom. Cath. hermeneutical writers are Hermann Goldhagen (Mainz 1765); Seemüller, *Hermeneutica Sacra* (1779); Mayr, *Institutio Juaup. Sacri* (1789); Jahn, *Enchiridion Hermen.* (Vienna 1812); Arigler, *Hermeneutica Generalis* (Vienna 1813); Unterkircher, *Hermeneutica Biblica* (1831); Ranolder, *Herm. Bibl. Principia Rationalia* (Fünf Kirchen 1838); Schnittler, *Grundlinien der Hermeneutik* (1844); Glaire's *Hermeneutica Sacra* (1840).

HERMES, *hĕr'mēz:* in Greek mythology, a god, corresponding to the Rom. Mercury; the god of speech, eloquence, the sciences, traffic, theft, and herds. His origin and character are peculiarly complicated and untraceable. Under his name are comprised several mythological personages, who personified the external expression of thought, whether human or divine. The principal of these are Teti, Thoth, Theuth, or Taut, the Egyptian Hermes; the Greek god properly so called; the Phœnician Taaut; the Carthaginian Sumes; the Etruscan Turms; the Chaldæan Duvanai; and the Latin Mercurius. The oldest of these was undoubtedly the Egyptian, whose worship appears as early as the 11th dynasty. Thoth was generally represented with the head of an ibis (*heb*), which was his living emblem, and expressed his name in hieroglyphs. These, according to the legends, he had invented and revealed to the monarch Thamus. Many religious books were believed to have been written by him, and all literary compositions were dedicated to him. He was scribe or clerk of the gods, and in the future state justified the good against their accusers, as he formerly had Osiris in the trial of that god and Typhon. In the contest between Osiris and Typhon, when Horus had torn off the diadem of his mother, Isis, Thoth is reported to have replaced it with the head of a cow. Locally, he was lord of Sesenu, Hermopolis, the modern Eshmunin, but his worship was universal. He was a self-created, self-existent god, though some legends of later date make him the son of Chnumis, or of the Nile. In his celestial character he was identified with the moon, *Aah*, and was supposed to preside over that luminary, and the souls which made it their habitation. He inscribed also the names of monarchs on the *asht*, or Persea, the Egyptian tree of life.

In the Phœnician mythology, Taaut, or Hermes, seems derived from the Egyptian, and was son of Misor, or Egypt, inventor of writings and the sciences; while another form of his name, Sumes, is that of the Punic Hermes of Carthage. It is, however, clear that the name Taaut is derived from the Egyptian Tet, 'word' or 'speech'. The tradition of Hermes has passed to the Arabs, who recognize two Hermes, one who lived 1,000 years after Adam, called by the Chaldees Ouriai or Duvanai, the great master; another, surnamed Thani, doctor of the world and liberator of men from error, a prophet and philosopher; and Trismegistus, or Trismegist, who lived at Calovaz, in Chaldæa.

Most important of all was the Greek Hermes. The various traditions which make him son of the Egyptian Nilus, whose name was never pronounced, or the sacred Thoth.

are clearly Egyptian; that which derives his origin from Ouranos, and Hémera, is probably the Phœnician myth. But the principal H. in whom the actions of the others centred, was son of Zeus and Maia, born on Mount Cyllene, in Arcadia, and originally a Pelasgian divinity who presided over cattle and commerce. His birth is placed subsequent to that of Apollo. Four hours afterward, according to the hymn, he left his cradle, and having found a tortoise, invented the *chelys*, or lyre, using its shell as a sounding-board, and making the strings out of the entrails of a sheep. At nightfall he stole 50 of the sacred herd of Apollo from Pieria, drove them to the banks of the Alpheius, slaughtered and dressed two of them. To escape detection, he had bound his feet with branches of the myrtle and tamarisk. Apollo, missing his cattle, dragged H. before Zeus, at Olympus, who condemned him to restore them; but Apollo, enchanted by the sound of the newly invented lyre, offered H. his cattle in exchange, gave him his whip or goad, taught him how to tend cattle, and presented him with the caduceus. In the *Iliad* and *Odyssey* are no traces of his thievish propensities, which were introduced by the later poets. In the Gigantomachia he liberated Zeus from Typhon, and restored him his limbs. H. was messenger, herald, and ambassador of the gods; he bound Prometheus to Caucasus; killed Argus with the hundred eyes; liberated the wandering Io, etc. In the events of the Trojan war, he conducted the goddesses to the fatal judgment of Paris, brought Priam to Achilles, and was patron of Ulysses, to whom he gave the herb molys, to liberate him from Circe. Many heroical and other personages were descended from him. As god of the sciences, he invented the alphabet from the flight of cranes, astronomy, and numbers, weights and measures, music, the lyre, and syrinx, gymnastics, tactics, and the cultivation of the olive. Many festivals were celebrated to him in n. Greece and the islands, as at Phenea, Cyllene, and Athens; and some of these Hermæa resembled the Saturnalia, slaves being served on these occasions by their masters. His worship, in fact, extended all over the Peloponnesus, the islands of the Ægean, Asia Minor, and even Hesperia or Magna Græcia. Among animals, the tortoise, pig, lamb, and goat, and the young of beasts, were sacred to him; the ibis and the gull (*larus*) among birds; and the palm-tree, black-thorn, cinque-foil, and purslane among plants. H. had a local worship in Samothrace, where he appeared as one of the Cabiri, under the name of Casmilos, son of Hephaistos or Vulcan, and Cabira. In the Eleusinian mysteries, he was represented by the hieroceryx.

The idea of H. seems to have been developed from two origins—the ancient Pelasgic or Arcadian god of shepherds, subsequently considered the patron of barter, of commerce, without any trace of intellectual qualities; and the Phœnician or Egyptian H., introduced by commerce into Greece, with all the attributes attributed by the Orientals to their deity. In art a similar development is seen from the old

squared trunks or pillars, called Hermæ and Hermidia, retained till a later period, but by degrees ornamented with a bearded head, to which sometimes are added phallic symbols, the destruction of which at Athens before the sailing of the Sicilian expedition led to a fearful tumult, and the fall of Alcibiades (q.v.). In later but still archaic art, H. is represented bearded, wearing the broad-brimmed petasus, and holding the twisted caduceus. At the time of Phidias, he was represented unbearded, with curly hair, a crafty and charming expression, and the form of an athlete. Instead of the petasus, wings are sometimes arranged in his hair; his boots are winged, and his caduceus has two snakes attached to it. His form is naked, but often has a *chlamys*, or cloak, doubled upon his shoulder, and his hand holds a purse of money; while the cock, referring to his invention of the gymnasium, or the hours of business; the tortoise, allusive of his discovery of the lyre; the palm-tree, emblem of his invention of letters; the goat, referring to his charge of herds, and paternity of Pan; and even the dog, allying him with Anubis, are placed at his side. The most remarkable type of the god was as carrying a ram upon his shoulders (*criophoros*). The caduceus was gilded at the top, painted blue in the middle, and black at the handle.

The Etruscans seem to have derived his worship directly from the Greeks, and represent him with the same attributes and type, but with the Etruscan name *Turms*, as the Camillus of the gods. His worship passed into Rome, under the name of Mercurius, or Mercury, by which he is more familiarly known, supposed to be derived from *mercari*, to traffic. There was something mystic in his cult, for the *feciales* did not know his nature, and he originally had the laurel instead of the caduceus, and the name of his mother, Maia, had been given to the month Maius, or May, on the 15th day of which his festival was held. As early as A.U.C. 259, he had a temple near the Circus Maximus, and his statue in that locality held a purse. At the Porta Capena was a well, sacred to him, and the merchants sprinkled themselves and their goods with the holy-water, obtained by dipping a laurel branch into the well. Tradition made him father of Evander by the nymph Carmenta, and of Larea by the goddess Lara; but the Romans adopted into their religious system the Greek traditions, though later, under the empire, the influx of foreign religions made them confound him with the Egyptian Anubis, and even represent him with a dog's or jackal's head, and depict him of golden or black color. His worship had even penetrated to Gaul, where he was adored under the name of Teutames. —Grüber, *Altklass. Wörterbuch Voce;* Gerhard, *Griechisch. Mythol.* (8vo Berl. 1854, I. 260); Hartung, *Rel. d. Römer* (8vo Frib. 1843); Birch, *Gall. Antiq.*, pp. 26, 27; Müller, *Arch. d. Kunst*, p. 560.

HERMES, *hĕr'mēs*, GEORG: Roman Catholic theologian of Germany, whose system has been the occasion of a long and acrimonious controversy: 1775, Apr. 22—1831, May 26; b. Dreyerwalde, in the diocese of Paderborn, in West-

phalia. Having received his early education from his parish priest, H. entered the gymnasium of Rheina, and thence was transferred, 1792, as a theological candidate, to the Univ. of Münster, where he speedily distinguished himself, as well by his ability and acuteness, as by his piety and exemplary life. In 1798, he was appointed prof. in the gymnasium of Münster; and after nine years, prof. of theology in the univ. of the same place. His lectures being of a popular character, and addressed mainly to the examination of modern philosophical systems, and thus bearing on revelation, attracted many hearers, and established for H. a high reputation in Germany; and when, 1819, the new mixed Univ. of Bonn was established, H. was appointed to a professorship of theology which he held till his death. His early reputation attended him here, and students flocked to his lectures from all parts of Germany, and even from the Low Countries.

H.'s great object seems to have been to counteract the influence of the philosophical systems, then in their full popularity, especially that of Kant; and with this view, he sought to deduce the foundations of all philosophical inquiry from the same first principles from which the Kantian philosophy takes its departure. His system, therefore, presupposes in the mind, as the starting point of all rational inquiry, a blank condition, which, as variously described by friends and enemies, is either simply the absence of all previous conviction, or a state of positive doubt, analogous to the so-called Pyrrhonism of the ancient schools. The Hermesian method of investigation, in like manner discards, in the first stages, and so far as investigation is permitted to extend, all principle of authority; and in the details of metaphysical inquiry, in the selection of the arguments of the existence of God, and of the nature of divine attributes, he departed widely from the old text-books of the schools; though in the general sum of the doctrines of the Rom. Cath. Church, his orthodoxy does not appear to have been called in question. The objections which arose were against his method.

Though his work, *Einleitung in die Christ-Katholische Theologie* (Introduction to Christian-Catholic Theology), was published 1819, and again 1831, it was not until after H.'s death that the controversy regarding his system took a definite form, and eventually, at the instance of Clement Augustus Droote-Vischering, Abp. of Cologne, was referred to Rome. A great controversy ensued, the chief assailant of the system being a learned Italian prof. of the Collegio Romano, the Jesuit, Father Perrone; while its defenders were almost exclusively Germans, mostly H.'s own friends and pupils. The controversy was protracted; and a very large, and it must be confessed, misty literature, has grown out of the subject. The result was that the doctrine of H. was condemned by a brief, 1835, Sep. 26 The German partisans of H., who had at their command a theological journal of considerable circulation, the *Journal of Bonn*, protested from the first against this condemnation, to which they applied, at least practically, the well-known distinc-

tion of 'fact' and 'right,' long ago employed by the Jansenists; contending, that though the doctrines contemplated by the brief were rightly condemned, as being unsound and untenable, yet no such doctrines were taught by H., or contained in his book. Two of the leaders of the party, Professors Braun and Elvenich, went to Rome to urge a reconsideration of the condemnatory decree; but their mission was unavailing, and the decision was ordered to be enforced without reserve. The Abp. of Cologne accordingly insisted on unqualified submission; and the opposition which he aroused tended much to complicate the difficulties of a conflict between him and the Prussian government, as to 'mixed marriages,' and which led eventually to his arrest and deprivation by the crown. The controversy was continued, in Rome and in Germany, for a considerable time; by degrees, however, the Hermesian party fell away. The professors of various universities, individually or in bodies, accepted the papal condemnation; and though some have still persevered in their resistance they have been almost exclusively of that extreme party, many of whom openly seceded from Rome, under the name of the German Catholic Church, and whose principles go even beyond orthodox Lutheranism, and may be regarded as verging on the most advanced Rationalism.

HERMESIANISM, n. *hĕr-mēz'ĭ-an-ĭzm:* in *chh. hist.*, method of religious inquiry taught by Georg Hermes (q.v.).

HERMETICAL, a. *hĕr-mĕt'ĭ-kăl*, or HERMET'IC, a. *-ĭk* [mid. L. *hermĕtĭcŭs*, relating to alchemy—from Gr. *Hermēs*, Mercury, the fabled inventor of chemistry]: chemical; perfectly closed, so that no air, gas, or spirit can escape or enter. HERMET'ICALLY, ad. *-lĭ*. HERMETICALLY SEALED, closed up or sealed by fusion, as the closing of a glass tube by melting the ends; closed securely. HERMETICAL MEDICINE, an obsolete system of medicine which looked for its remedies not to nature, but to the philosophy attributed to the mystic Hermes Trismegistus. Astrology was used to discover the origin and termination of diseases. HERMETICAL PHILOSOPHY, a philosophy which attempted to account for all physical phenomena by the operation of the three chemical agents, salts, sulphur, and mercury.

HERMET'IC BOOKS: ancient writings of a variety of classes, so named at different periods—some claiming to be divinely inspired, others to open the hidden philosophy of the nature of things, others to contain the secrets of alchemy or astrology. Among the Egyptians, all books or literary compositions appear to have been dedicated to Thoth, and notices of this nature are appended to several papyri. The earlier religious books, such as the Ritual, were supposed to have been written by the fingers or under the dictation of the god Thoth himself, and several chapters of this and other works are stated to have been found on monuments written by the god. Hence the word hermetic, taken in its most extended sense, meant *inspired*, as Thoth was the scribe of the gods. Various traditions pre-

vailed as to the number and nature of these books. Clement of Alexandria mentions 42 H. B., which contained the sum of all knowledge, human or divine; while others, as Iamblichus, raise their number to 20,000; and Manetho gives the astronomical cipher of 36,525. The series of books mentioned by the great authors were: 1. Sacred hymns of Osiris; 2. On the Life of a King; 3–6. Astrological precepts and observations; 7–17. Cosmography, geography, and chorography of Egypt and the Nile; 18–27. Laws, and discipline of priests; 28–33. Medicine. Portions of these books have been undoubtedly found in the hieratic papyri. Under the name of H. B., several writings, principally Greek, have been handed down, which pretend to be translated from the Egyptian, and similar books may have existed in the 2d c. But these books contain notions of the Neo-Platonic school of Porphyry and Iamblichus, and appear intended as philosophical works giving an explanation of the genesis of the Cosmos, the nature of God and man, in antagonism to the books or the Old and New Testament, from sources partly Egyptian, partly Persian and Rabbinical, and other traditions of the Alexandrian school. They were produced to supply a substitute for Christianity, when it had become evident to the thinkers of the pagan world that Christianity was rapidly rising into supremacy over all the other philosophies. The name of hermetic writings was particularly affected by the alchemists and astrologers of the middle ages, e.g., *Tractatus Vere Aureus*, by Dominicus Gnostus, 1610; *Tabula Smaragdina*, or 'Emerald Table of Alchemy,' 1541; and various others. The principal tenets of the H. B. are, that the Creator made the Cosmos by his word out of fluid; that the soul is a union of light and life, and proceeded from the cosmic soul; that death and life are only changes, and that nothing is destructible; that the soul transmigrates; that passion or suffering is the result of motion.—Baumgarten-Cruzius, *De Librorum Hermeticorum Indole* (Jena 1827); *Hermes Trismegistus*, a Scheible (12mo, Stuttg. 1855); *Hermes Trismegistus* (*Poemander*) a Parthey (8vo, Berol., 1854).

HERMINIA, n. *hĕr-mĭn'ĭ-a* [Gr. *Hermēs*, the Greek god corresponding to the Latin Mercury]: typical genus of *Herminidæ*, family of moths, group *Geometrina*.

HERMIONE, n. *hĕr-mī'o-nē:* in Gr. *myth.* daughter of Menelaus and Helen, and the wife of Orestes.

HERMIT, n. *hĕr-mĭt* [F. *hermite*—from mid. L. *hĕrĕmītă*—from Gr. *erēmītēs*, a solitary—from *erēmĭă*, a desert: It. *eremita*, a hermit]: one who retires from society and lives in solitude for devotional purposes; an anchorite; a recluse or ascetic. *Hermit* was one of the names given in the early ages, and still more in the later church, to a class of solitary ascetics, who, for religious purposes, withdrew from the ordinary intercourse of life, and took up their abode in natural caverns or rudely formed huts in deserts, forests, mountains, and other solitary places. In the first centuries, the names of Eremite and Anchorite (q.v.) were

indiscriminately applied to these solitaries; but the word *eremita* having been adopted into Latin, it is more commonly used in the modern languages which are derived from the Latin; and the Germans use the name *Einsiedler*, which is of the same signification. The hermits of the middle ages, like the primitive anchorites, often lived in complete solitude; but a much more common, and, in its influence on the church, more important form of the institute, was that of a community of hermits, each possessing his separate hermitage, but all meeting at stated times for mass, prayer, religious instruction, and other common and public exercises. The various hermits of this class are regarded as constituting religious orders, and though never attaining to the popularity which distinguished the Franciscans, the Capuchins, the Dominicans, and other active orders, they form, nevertheless, a numerous and influential element in the spiritual life of the Rom. Cath. Church. The most remarkable of the eremitical orders are—the Hermits of St. Augustine, who trace their origin to the holy father of that name, but are subdivided into several varieties which had their rise in the 11th, 12th, and 13th c.; the Camaldolese, founded by St. Romuald 1012; the Celestines, branch of the Franciscans, established by Peter Murrone, afterward Pope Celestine V.; the Hieronymites (q.v.) established first in Castile in the 14th c., thence introduced into other parts of Spain and into Italy by Lope d'Olmeda 1424; and the Paulites, so called from one St. Paul, the first hermit, but an institute of the 13th c., which had its origin in Hungary, and attained wider extension and greater popularity than perhaps any other among the eremitical orders.—See Helyot, *Histoire des Ordres Religieux;* also Wetser, *Kirchen-Lexicon*, art. *Einsiedler*. HER'MITAGE, n. *-mĭ-tăj*, or HER'MITARY, n. *-tĕr-ĭ*, cell or hut of a single hermit; sometimes the aggregate of the cells occupied by the members of a single community. Many of these, from the reputation of their inmates, or as being the scenes of certain popular miraculous legends, attained great celebrity, and became the nuclei of important ecclesiastical establishments, and, in some instances, of large and popular cities. Figuratively, the term denotes a secluded and solitary abode. HERMIT'ICAL, a. *-ĭ-kăl*, pertaining to a hermit or to a retired life.

HERMIT CRAB. common appellation of a large family (*Paguridæ*) of crustaceans, of the order *Decapoda*, suborder *Anomoura* (see CRAB), having the abdominal or tail segments much more largely developed than in true crabs, but undefended by hard plates, aud not forming an organ for swimming, as in lobsters, prawns, and other *Macroura*. The soft and tender tail requires a protective covering, which the instinct of the hermit crabs leads them to find in some turbinated univalve shell of suitable size. The most common British species (*Pagurus Bernhardus*) may be found wherever little pools are left by the tide on a rocky or shelving coast. Shells or whelks, periwinkles, etc , may be seen moving about in the pools in a manner very different from that in which they were carried by their original

molluscous owners, having now become the property and habitations of hermit crabs, by which, perhaps, the mollusks were eaten. On the slightest alarm, the H. C. retires into the shell, guarding the aperture of it with one claw,

Hermit Crab (*Pagurus Bernhardus*):
a, animal out of the shell; *b*, in shell; *c*, a jaw-foot.

which is much larger than the other, the hard points of the feet also projecting a little. The whole structure of the animal is adapted to such a habitation. The part which in the lobster becomes a finlike expansion at the end of the tail, becomes in the H. C. an appendage for firmly holding by the shell; and so firmly does the H. C. hold, that it may be pulled in pieces, but cannot be pulled out. Some species have suckers to render the hold more perfect. Increase of size, however, renders it necessary for hermit crabs to relinquish their old shells and seek new ones. Hermit crabs are interesting inmates of the aquarium, but their locomotive habits and their voracity make them unsuitable for an aquarium otherwise very finely stocked. They feed on mollusks, and on all the animal garbage of the sea-shore.—Some of the hermit crabs of warmer climates are much larger than the British species; some of them (genus *Cœnobita*) inhabit land-shells, and some are found even at a distance from the sea.

HERMODACTYL, n. *hĕr'mō-dăk'tĭl* [Gr. *Hĕrmēs*, Mercury; *daktŭlŏs*, a finger]: Mercury's-finger, root shaped like a heart flattened, and of white color, brought from Turkey, and formerly used in medicine for gout and rheumatism. It is mentioned by Alexander of Tralles, 560; Paulus Ægineta, a century later; Avicenna, Serapion etc. By some old writers, it was termed *anima articulorum*, or *the soul of the joints*. Corms, probably of several species of colchicum, are still sold in Greece and in the East under the name of hermodactyls. No modern experiments have been

made to determine the activity of hermodactyl, and the subject is one rather of historical than of practical interest.

HERMOGENIANS, n. *hėr-mo-jē'nĭ-anz:* obscure, semi-Christian sect, followers of Hermogenes, who lived toward the end of the 2nd c. Having tendencies toward gnosticism, he believed matter to be the root of all evil, yet that from it was formed everything in the world, the human soul not excepted.

HERMON, *hėr'mon* (known also as SIRION, SHENIR, JEBEL ESH SHEIKH, and JEBEL ETH THELJ): highest range of the mountain system of Syria, 40 m. n.e. of the Sea of Galilee, 30 m. s.w. of Damascus, 9,053 ft. above the Mediterranean, and 11,000 ft. above the valley of the Jordan; formed by a spur from Anti-Lebanon. It has a dome-shaped summit supporting three knolls and rising from a ridge extending n.e. and s.w. 20 m. The peaks are covered with snow in winter and bare in summer and autumn; the slopes to the height of 500 ft. are covered by dense forests of oak, white poplar, and brush, and the foot of the range is occupied by vineyards and orchards. The view from the summit comprises all Lebanon, the plains e. of Damascus, Palestine as far as Carmel and Tabor, and on a clear day, Jaffa. H. exhibits the remains of several small temples supposed to date from A.D. 200. It formed the n.e. boundary of Israel, is frequently mentioned in the Old Test., and is believed by many to have been the scene of the transfiguration (Matt. xxii.; Mark ix.), though concerning this there is no definite knowledge.

HERMOP'OLIS, or SYRA: capital of the Cyclades: see SYRA.

HERMOSILLO, *ār-mō-sēl'yō:* city in the n.w. of Mexico, state of Sonora, on the river Sonora about 60 m. e. from the Californian Gulf, and 90 n. of the port of Guaymas. The town lies in a valley, 10 m. long by 4 broad. The climate is dry and very hot, but the place is nevertheless considered healthful, being free from the epidemics which often accompany very high temperatures. The valley is very fertile, and produces grapes, melons, figs, oranges, limes, lemons, citron, peaches, and pomegranates in great abundance. The vine, however, is the principal object of cultivation, not less than 1,500 barrels of brandy being annually made. The town has a large trade with Guaymas, being the principal entrepôt in the n.w. part of the country for the trade with the interior. Pop. 18,000, including many Yaqui Indians.

HERNIA, n. *hėr'nĭ-ă* [L. *hernĭă,* a rupture—from Gr. *hernos,* a branch, a sprout]: the protrusion of some part of the intestine from its proper place; a rupture. HER'NIAL, a. of or relating to hernia.—*Hernia* in its widest sense, signifies a protrusion, through an abnormal or accidental opening, of any organ from its natural cavity. Although hernia may occur in many parts of the body, the word, used by itself, is restricted to protrusion of the abdominal viscera.

The way in which hernia may arise will be understood,

if we bear in mind that the abdominal viscera are subject to violent pressure from the diaphragm and other surrounding muscles. This pressure forces them outward and downward agains the walls of the belly; and if at any point these walls are not sufficiently strong to resist this pressure, some portion of the viscera is driven through them, and a hernial tumor is formed. Certain parts of the abdominal walls, especially the inguinal and crural rings, and the umbilicus, being weaker than others, offer the most frequent opportunity for hernia. In some instances hernia is congenital, as from abnormal deficiency of the walls; in other cases, it mav arise at any period of life as a result of violent bodily exertion. Sex, age, and occupation seem to have marked influence in predisposing to hernia. Men are far more liable (in about the proportion of four to one) to this accident than women; though they are less so to those forms of the affection known as femoral and umbilical hernia. According to Malgaigne, in France, one man in 13 and one woman in 52, are subjects of hernia. In respect of age, he found that the liability is least about the age of 13 years (1 in 77), after which it progressively increases until the close of life, rising at 70–75 years to 1 in 3.

A hernia is almost always composed of *a sac* and *its contents*. The sac is a portion of the peritoneum (q.v.) corresponding to the aperture at which the hernia protrudes. It is pushed forward by the protruding viscera, and forms a pouch. The contents vary greatly, but consist generally of a portion of the small intestine (particularly of the ileum), forming the variety of hernia known as *enterocele*. Omentum is often found in hernial sacs, together with intestine. Besides the viscera, the sac always contains a certain quantity of fluid secreted by its interior. Hernia is divisible (1) into *reducible*, or returnable into the abdomen, *irreducible*, and *strangulated;* and (2) according to its situation, into *inguinal, crural* or *femoral, umbilial, diaphragmatic*, etc.

The treatment of reducible hernia may be either palliative or radical. The palliative treatment consists in the application of a truss (q.v.) to retain the protrusion within the cavity of the abdomen. Each particular kind of hernia (femoral, inguinal, etc.) requires its special form of truss; and before applying it, the hernia must be reduced by placing the patient on his back, relaxing the muscles by bending the thigh upon the abdomen, and pressing the tumor back in the proper direction. The truss should then be put on, and should be worn during the whole of the day; and if the patient wili submit to wear it (or a lighter one) during the night, so much the better. The means that have been contrived to effect a radical cure are too purely surgical for description in these pages. Below the age of puberty, and if the hernia is recent, a radical cure is sometimes effected by wearing the truss for two or three years.

In irreducible hernia the protruded viscera cannot be returned into the abdomen, but there is no impediment to

the passage of their contents or to the circulation of blood in their walls. In these cases, the patient is often liable to dragging pains in the abdomen, and to attacks of vomiting, in consequence of the movements of the stomach being checked by the omentum or intestines being fixed. There is also constant danger of this hernia passing into the strangulated form. The treatment may be either palliative or radical. The palliative treatment consists in the employment of a truss with a hollow pad that shall embrace the hernia, and prevent any additional protrusion. A cure may *sometimes* be obtained by keeping the patient in the recumbent position, and on very low diet, for two or three months: at the same time keeping the bowels open by laxatives and injections, and maintaining equable pressure over the tumor.

Hernia is said to be strangulated when a portion of intestine or omentum that is protruded is so tightly constricted that it not only cannot be returned into the abdomen, but has its circulation arrested. This form is highly dangerous, because, if relief is not speedily afforded, the strangulated part becomes gangrenous. The causes of strangulation are various, but this condition most commonly arises from a sudden violent effort, by which a fresh portion of intestine is driven into a pre-existing hernia, which it distends to such a degree as to produce this complication. The most prominent early symptoms are flatulence, colicky pains, etc. They are succeeded by vomiting first of the contents of the stomach, then of mucus and bile, and lastly of fecal matters, owing to inverted peristaltic action. If relief is not obtained, the inflammation that commences in the sac extends to the peritoneum, and the ordinary signs of peritonitis appear. After a variable time, comes gangrene or mortification of the part, and the patient speedily sinks.

The surgeon first tries to return the intestine, as in the preceding cases. This manipulation, termed taxis, may be assisted by the use of chloroform, inhaled till it produces complete relaxation of the muscles, by the hot bath etc., but it should be performed very gently and should not be persisted in for too long a time. If this fails, recourse must be had to the knife to divide the constriction.

HERNÖSAND, *hĕr′nō-sȧnd:* town of Sweden, cap. of a län of the same name, on the w. side of the island of Hernö, near the mainland and connected with it by bridges. It is the seat of a Rom. Cath. bp.; contains a cathedral, public library, public-baths, printing establishment, engine-works, lumber-yards, saw-mills, linen-mills, and various manufactories; exports tar and linen goods; imports salt, corn, wine, and manufactured goods; has a fine harbor and considerable fishery trade; was founded 1584 and received town privileges 1587. Pop. 8,000.

HERO, n. *hē′rō,* HE′ROES, n. plu. *-rōz* [OF., *heroë,* a demigod—from L. *herōĕm,* a hero—from Gr. *hērōs,* a demigod, a hero: F. *héros,* a hero: comp. Fin. *uros,* an

adult male, a brave man]: a man who evinces remarkable intrepidity, enterprise, or courage in matters connected with danger or suffering (see HEROES): the principal male character in a poem or tale. HEROINE, n. fem. *hĕr′ŏ-ĭn* [F. *heroïne*—from mid. L. *hērōīnă;* Gr. *hērōīnē*, a demi-goddess, a heroine]: a female hero; a brave woman; the principal female character in a story. HEROIC, a. *hē-rō′ĭk*, or HEROICAL, a. *hē-rō′ĭ-kăl*, pertaining to a hero or heroes brave; magnanimous. HERO′ICALLY, ad. *-lĭ*. HEROI-COMIC, a *hē′rō-ĭ-kŏm′ĭk*, or HE′ROI-COMICAL, a. *-ĭ-kŏm′ĭ-kăl*, consisting of the heroic and the ludicrous; serio-comic. HEROISM, n. *hĕr′ō-ĭzm*, the quality or character of a hero; bravery; valor. HE′ROSHIP, n. the character of a hero. HERO-WORSHIP, *-wĕr′shĭp*, extravagant admiration of great men. HEROIC AGE, the age when heroes, or the supposed children of the gods, are fabled to have lived. HEROIC VERSE, that verse in which the life of a hero is celebrated; epic poetry; the *heroic verse* in English consists of five iambic feet (iambic pentameter), and in classic poetry the hexameter (see METER: VERSE).—SYN. of 'heroic': noble; intrepid; enterprising; illustrious; bold; fearless; courageous; undaunted; valiant; gallant; daring.

HERO, *hē′rō:* legendary priestess of Venus, celebrated for her love for Leander. At a festival of Venus and Adonis, as Sestos on the Thracian coast, Hero and Leander first saw each other, and were inspired with a mutual passion. Hero's position as a priestess, and the will of her parents, opposed their union. Undaunted by these obstacles, Leander every night swam across the dangerous Hellespont to visit his beloved, who directed his course by placing a burning torch on a tower on the sea-shore. On one tempestuous night, the torch was blown out, and Leander, unguided, was drowned and cast on shore at the foot of the tower, where Hero anxiously awaited him. At the sight of the body, she threw herself from the tower. Virgil and Ovid refer to this tale. A poem has come down to us under the name of Musæus, in which this story is sung; Schiller likewise has made it the subject of a beautiful ballad.

HE′ROD THE GREAT, King of the Jews: abt. B.C. 74–4 (reigned B.C. 40–4); second son of Antipater, who was made procurator of Judæa by Julius Cæsar, B.C. 47; of a family which rose to power in Judea during the period which immediately preceded the complete destruction of the Jewish nationality. The family was of Idumean descent; but though alien in blood, was Jewish in religion, the Idumeans having been conquered and converted to Judaism by John Hyrcanus B.C. 130. At the time of his father's elevation, Herod, though only 15 years of age, was made gov. of Galilee, and afterward of Cœle-Syria; and finally, he and his elder brother were made joint-tetrachs of Judea; but he was soon displaced by Antigonus, representative of the Asmonean dynasty, and forced to flee to Rome, where he obtained, through the patronage of Antony, a full recognition of his claims, together with the title king of Judea,

B.C. 40. Several years elapsed, however, before he succeeded in establishing himself in Jerusalem. On the fall of Antony, he managed to secure a continuance of favor from Augustus, from whom he not only obtained a confirmation of his title to the kingdom, but also a considerable accession of territory, B.C. 31. From this time till his death, his reign was undisturbed by foreign war; but it was stained with frightful cruelties and atrocities Every member of the Asmonean family, and even those of his own blood, fell in succession a sacrifice to his jealous fears; and in the latter years of his life, the lightest shade of suspicion sufficed as the ground for his wholesale butcheries, which are related in detail by Josephus. Of these, the one with which we are best acquainted is the slaughter of the infants at Bethlehem. The one eminent quality by which Herod was distinguished, was his love of magnificence in architecture, and the grandeur of the public works executed under his direction. Even by these, however, he alienated the Jews, who ascribe them all to his Gentile leanings, and to a covert design of subverting the national religion. Herod married ten wives, by whom he had fourteen children. His life of pride was ended by a loathsome disease.

HER'OD AGRIP'PA I. See AGRIPPA, HEROD I.

HER'OD AGRIP'PA II. See AGRIPPA, HEROD II.

HEROD ANTIPAS, *hĕr'od ăn'tĭ-pas:* Tetrach of Galilee and Paræa (ruled B.C. 4–A.D. 39); son of Herod the Great by his wife Malthace, a Samaritan. He divorced his first wife, daughter of Aretas, King of Arabia Petræa, in order to marry Herodias, wife of his half-brother Philip, a crime against which John the Baptist remonstrated, and was in consequence put to death. It was during a visit of Herod Antipas to Jerusalem for the purpose of celebrating the passover that our Lord, as having been a resident of his tetrarchate, was sent before him by Pilate for examination. At a later time, he made a journey to Rome, in the hope of obtaining the title of king; but he not only failed in this design, but, through the intrigues of Herod Agrippa, was banished to Lugdunum (Lyon) where he died in exile.

HERODIANS, *hĕ-rō'dĭ-anz:* class of Jews variously regarded as a religious sect and as a political party. Some authorities claim that they were mostly Sadducees who preferred the tyranny of the Herods to that of the Romans; while others assert that they favored the Roman govt. and opposed the Jews, who were hostile to it. Some have deemed them a separate Jewish sect who regarded Herod the Great as the Messiah; of this there is no proof. The Pharisees took counsel with them how they might destroy Jesus (Matt. xxii. 16; Mark iii. 6; xii. 13).

HERODIANUS, *he-rō-dĭ-ā'nŭs,* or HERODIAN, *hē-rō'-dĭ-an:* supposed A.D. 170–240; b. Greece: historian. He is believed to have passed the greater part of his life in Rome and been somewhat identified with political affairs; but no records of his life have been preserved beyond the few per-

sonal notes in his history of Rome. This covers the period 180–238, from the death of Marcus Aurelius to the accession of Gordianus III., deals with the events of the reigns of 17 emperors, is written in 8 books in the Greek language and after the style of Thucydides, and is generally accepted as an impartial narrative. Editions of the history were published 1789–1805, 1816, 26, and 55.

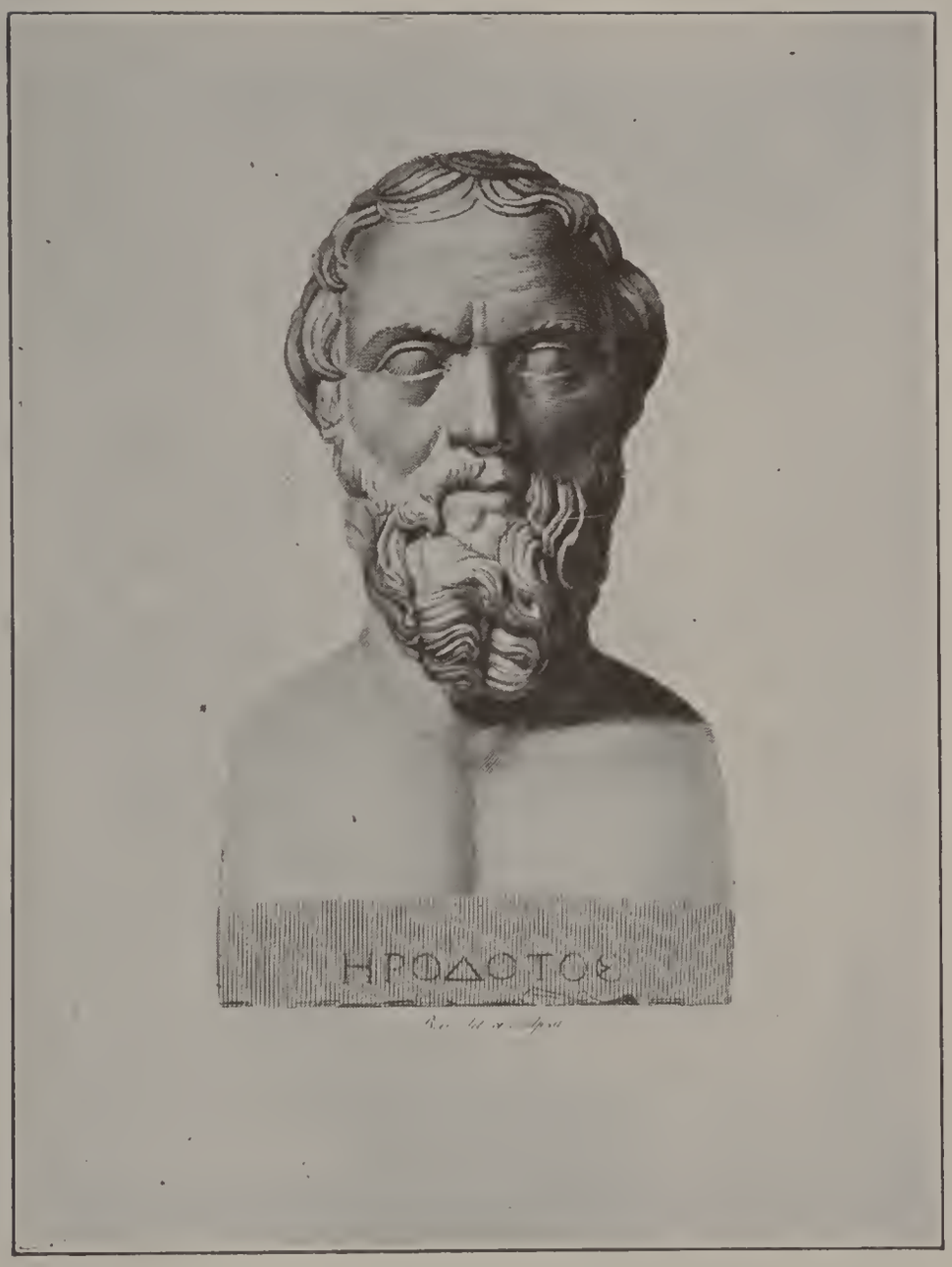
HERODOTUS, *hē-rŏd'o-tŭs:* the oldest Greek historian; usually styled the 'Father of History': abt. B.C. 484–abt. 424; b. at Halicarnassus, in Caria. He appears to have early resolved to write a historical work on an extensive scale, and with this view determined to visit and observe the most remote countries and nations. Although the dates and extent of his travels are involved in obscurity, and sometimes even in contradictions in the ancient narratives, we gather from his own statements that in his early youth he visited the islands and coasts of Asia Minor; that subsequently he gave particular attention to Egypt, at that time little known; that he next visited Palestine and Phœnicia; and finally penetrated as far e. as Babylon and Susa. We are informed also that he sailed through the Hellespont into the Black Sea, and visited all the countries on its shores. After his return he appears to have resided for a time at Athens. He speaks of having seen the *Propylæa*—i.e., the entrances to the Acropolis, which were not finished till the outbreak of the Peloponnesian war (B.C. 431). He also interested himself warmly in the politics of his native city, was instrumental in delivering it from the tyranny of Lygdamis, a vassal of Persia, but being what we should call 'a moderate liberal,' he had the misfortune to offend the extreme or popular party, and in consequence withdrew to Thurii, in Italy, whither many of his fellow-citizens had previously proceeded. Here, in all probability, he wrote his immortal work in the decline of his life. Lucian, a mediocre authority on such a subject, states that about B.C. 456 he read the nine books before the Greeks assembled at the Olympic games, but this is contradicted by the numerous allusions in the *History* to incidents of later occurrence—for example, the revolt of the Medes against Darius Nothus (B.C. 409–408). The statement of Pliny, that it was composed in his old age at Thurii, is the most probable, and best agrees with the unfinished programme of the work and its abrupt termination, as if the author were prevented by death from finishing it as he intended. According to Suidas, he died and was buried at Thurii about B.C. 408: as to place this accords with the predominant testimony of antiquity; but the date is probably about 16 years too late.

The purpose of Herodotus in his *History* is to describe the great war between the Persians and the Greeks—the struggle for supremacy between Europe and Asia, between civilization and barbarism, between freedom and despotism. Herodotus, wishing to indicate that the antipathy between the two was not the result of an accidental quarrel, but of a deep-rooted difference of character traces it back to the

mythical ages. This was the only way in which a man of his time could express what we mean when we speak of the differences of *race*. In the course of his *History*, he gives an account of the various countries which he had visited. Wherever he gives the results of his own observations and inquiries he evinces wonderful accuracy and impartiality; and when he is not an eye-witness, he has been understood to say so. His credibility was suspected by Blakesley, and mercilessly impugned by Weidemann; recently Sayce, in his *Herodotus* (1883), affirms him to have plagiarized largely, and to have professed to visit places that he never saw—places, in fact, which did not in his time exist. He was in any case eminently uncritical, and had no place in his mind for the philosophy of history. His credulity and natural love of effect may invalidate some of his statements about remote periods, concerning which he trusted to others; but they detract but little from his trustworthiness in dealing with later periods which formed his special subject. Certainly as a *writer* of history, the charm of his work is perennial and undisputed. Herodotus wrote in the Ionic dialect, but Attic, Doric, and epic forms occur in his work. The style is marked by an easy grace and lively vigor. by simplicity, freshness, and naturalness. The first edition (in Latin) by Laurentius Valla, appeared at Venice 1474; the first in the original Greek at Venice 1502. The chief modern editions are those of Schweighauser (1806), Gaisford (1824), Bähr (1834–61), Abicht (1869), Stein (1871). School editions are those of Matthiæ (1825), Bekker (1833, 45), G. Long (1830), and Negris (1834). A variety of translations of the writings of Herodotus have been published, as well as of historical and geographical treatises calculated to facilitate the study of the celebrated historian.

HE'ROES: in the Homeric period, the kings, princes, generals, leaders, all brave warriors, and men who excelled in strength, courage, wisdom, and experience. Many of these had, on account of such qualities a fabled origin, half human, half divine, and were honored, after their death, with a kind of inferior worship. These heroes and demigods were recognized as the special patrons or protectors of particular countries and cities, and to them were raised temples and altars. These examples of heroic character, held up constantly to the admiration and imitation of peoples, tended to strengthen their peculiar character, and to impress them with the greatness and glory of courage, contempt of danger, and nobility of purpose. Poetry exalted the heroic sentiment to sublimity, and poems which celebrated the deeds of heroes, are themselves termed heroic. The imaginary time when heroes and other semi-divine beings lived on earth was called the HEROIC AGE. See AGES.

HERON, n. *hĕr'ŭn* [F. *héron;* OF. *hairon,* a heron—from mid. L. *airōnem,* a heron; AS. *hragra;* Sw. *hägr,* a heron—probably from the harsh cry of the bird: W. *cregyr,* a screamer, a heron]: a large long-legged fowl living on fish.



HERODOTUS.

HERONSHAW, n. *hĕr'ŭn-shaw* [OF. *heronçeau;* Eng. *heron,* and Scot. *shaw* or *schaw,* a wood]: a heron; the schaw or wood where herons breed. HER'ONRY, n. *-rĭ,* a place where herons breed.

HER'ON (*Ardea*): genus of birds, of the order *Grallatores,* tribe *Cultrirostres,* and family *Ardeidæ.* This family includes also Bitterns, Night Herons, Spoonbills, Boatbills, Storks, Adjutants, Ibises, etc. (see these titles). The bill is long, compressed, and sharp; tail short; legs and toes are long and slender; wings long. In the herons—in which genus are included the species commonly designated EGRETS (q.v.), which differ only in unimportant particulars of plumage—the bill is slender, but strong, forming a compressed and lengthened cone; the plumage is beautiful but seldom exhibits very gay colors; white, brown, black, and slate color, finely blended, being generally predominant. The body is small in proportion to the length of the neck and limbs; the neck is long, and, except in flight, is usually held curved. In flight, the heron carries the neck head, and long bill in a straight line before the body, and the long legs in a like manner stretched out behind. Herons feed mostly on fish, frogs, and other aquatic animals; and may be seen particularly very early in the morning and late in the evening, standing patiently motionless in some shallow water, at the margin of a lake or stream, or on the sea-shore, waiting till prey come within reach. In default of their more common food, however, herons sometimes prey on young birds, reptiles, and the smaller mammalia. They usually go forth singly in quest of prey, but are mostly gregarious in their nidification. The COMMON HERON (*A. cinerea*) is about three ft, in length from the point of the bill to the end of the tail. It is of delicate gray color on the upper parts, except the quill feathers, which are black, and the tail, which is deep slate color. The common heron generally builds its nest in a high tree, and many nests are sometimes seen in a single tree. Pennant tells us that he counted 80 in one oak in Lincolnshire. In very northern parts of the world, the heron is known only as a summer bird-of-passage, but it remains in Britain all the year. Its geographical range extends over most parts of Europe and Asia, and includes n. Africa. The heron was formerly in great esteem for the table, though now disregarded; it was also the kind of game most of all pursued in falconry. The PURPLE HERON (*A. purpurea*) is a smaller and much rarer species, having a great range in the old world. The GREAT WHITE HERON, or GREAT EGRET (*A. alba*), a mere accidental visitor of w. Europe, is more common in Turkey, Greece, etc., and in some parts of Asia. It is extremely beautiful, with perfectly white plumage, much of it loose and flowing. The LITTLE EGRET (*A. garzetta*) also has white flowing plumage. It is only about two ft. in length. The largest species of egret, *A. occidentalis,* is thus far known only in Florida and Cuba; it differs little from the great egret, *A. alba,* of the old world. America has many species of heron, most numerous

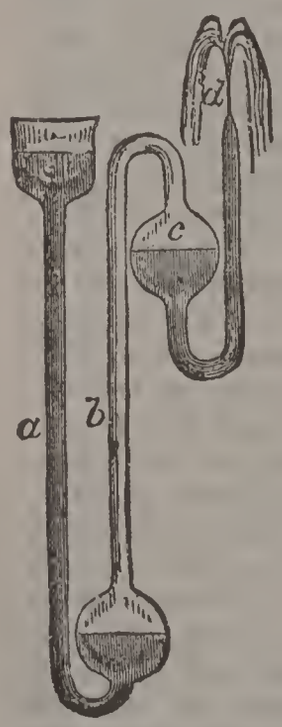
in its warmer regions. The most common species in temperate N. America is the GREEN HERON (*A. virescens*), the flesh of which is so much esteemed that it is often seen in the markets. Corresponding to the common heron of Europe is the great blue heron of America, *A. herodias*, which exceeds the former in size. The largest of all herons is *A. goliath*, of Africa and Asia.

Heron and egret plumes, made of the long feathers. were in former times highly valued, being, in some countries, deemed an ornament fit for royal personages, or for the highest nobles.

HER'ON, or HE'RO (commonly known as HERON OF ALEXANDRIA): mathematician and natural philosopher: B.C. 281–224; pupil of Ctesibius. He constructed a great number of machines and automata—mostly, however, as toys, among which are *Hero's Fountain* (q.v.): a *steam-engine* on the principle of Barker's mill (a vessel being caused to revolve by jets of steam issuing from lateral holes in the arms with which it is provided); a double forcing-pump used for a *Fire-engine* (q.v.), and various other similar applications of air and steam. It is but recently that the remarkable claims of Heron to such discoveries have received any notice, for in the valuable work of M. Dutens, entitled *L'Origine des Découver tes attribuée aux Modernes*, the name of Heron is not even mentioned. Among his works which have come down to us in fragments is *Pneumatika*, his most valuable work, in which the above mentioned machines and many others are figured and described. The best edit. of his works is in *Veterum Mathematicorum Opera* (Paris 1693).

HEROÖP'OLIS. See SUCCOTH.

HEROPHILUS, *hē-rŏf'ĭ-lŭs:* one of the greatest physicians of antiquity: b. at Chalcedon, in Bithynia; living B.C. 4th and 3d c. He settled at Alexandria, and distinguished himself by his devotion to anatomy, said to have been carried to such an extent that he dissected criminals alive. Several names which he gave to different parts of the body are still in use, as the 'Torcular Herophili,' the 'Calamus scriptorius,' and the 'Duodenum.' Herophilus placed the seat of the soul in the ventricles of the brain. Of his writings, only a few fragments remain, collected and published in a dissertation *De Herophili Celeberrimi Medici Vita, scriptis, atque in Medicina Meritis* (Gött, 1840).



Hero's Fountain.

HE'RO'S FOUN'TAIN: pneumatic apparatus invented by Heron (q.v.) or Hero, through which a jet of water is supported by condensed air. A simple mode of constructing it by means of

glass tubes and a glass-blower's lamp is shown in the annexed figure. The column of water in the tube *a*, compresses the air in *b;* this presses on the surface of the water in *c*, and causes it to gush out at *d*.

HEROSTRATUS, *hē-rŏs'tra-tŭs:* an Ephesian, who, from a desire of future fame, set fire to the magnificent temple of Diana, B.C. 356. He expiated the deed by a painful death; and, by a decree of the Ionians, capital punishment was to be inflicted upon any one who should mention his name; a decree which produced an effect directly the reverse of what had been intended. The temple is said to have been fired on the night that Alexander the Great was born.

HERPES, n. *hėr'pēz* [Gr. *herpēs*, a spreading eruption on the skin—from *hĕrpo*, I creep along: F. *herpes*]: disease of the skin characterized by vesicles, sometimes as large as a split-pea, occurring in clusters on an inflamed base, and ending in scabbing and desquamation, after a few days or weeks. In herpes zoster, or zona, the largest and most marked variety of the disease, there is the additional peculiarity, that it extends in patches around one side of the body, usually passing sharply up to the middle line, but not beyond it either before or behind. In *herpes labialis*, popularly called cold sores or fever-blisters, frequent moistening of the vesicles with spirit of camphor will frequently cause a speedy disappearance of the trouble. *Herpes zoster*, which is a nervous affection and frequently accompanied by neuralgic pains, calls for soothing and cooling applications; there is no danger; but the smarting during the eruptive period, the neuralgic pains, and the itching, are often very distressing to the patient. They may be somewhat relieved by the application of cold cream, and other simple soothing external applications. HERPETIC, a. *-pĕt'ĭk*, creeping; spreading; of or resembling herpes.

HERPETOLOGY, n. *hėr'pĕ-tŏl'ŏ-jĭ* [Gr. *herpĕton*, a reptile; *logos*, discourse]: branch of natural history which treats of reptiles. The Batrachians or Amphibia having, till recently, been included by naturalists generally—as they still are by many—in the class of reptiles, the science of Herpetology may be regarded as including the study of them. Herpetology received a share of attention from the naturalists of antiquity and the earlier naturalists of modern times. The name most deserving of notice in connection with it before the time of Linnæus is that of Ray. In the end of the 18th c. and beginning of the 19th, herpetology received special attention from Lacépède, Brongniart, Latreille, and Daudin, all of whom, as well as Cuvier, contributed greatly to its progress. More recently, it has been much advanced by the labors of Schlegel, Fitzinger, J. E. Gray, Müller, Owen, etc. The work of Spix on the *Reptiles of Brazil* is one of the most important contributions. Bell's *History of British Reptiles* (Lond. 1839) contains a very full account of all the British

species, including the Batrachians. Herpetology derives great additional interest from the numerous fossil remains of reptiles of former geological periods, and from the great size and extraordinary characters of many of them. HERPETOLOG'IC, a *-pĕt'ŏ-lŏj'ĭk*, pertaining to. HER'PETOL'-OGIST, n. *-jĭst*, one versed in.

HERRE'RA, FERNANDO DE: 1534–1597; b. Seville: Spanish poet. When advanced in life he took orders as a priest. He was master of Greek, Roman, and Italian literatures, and was a man of prodigious learning. As a poet he ranked so high in the opinion of his contemporaries, that they bestowed upon him the appellation the *divine*. Many of his erotic poems are remarkable for tender feeling; while his odes frequently display a lofty enthusiasm, but the expression is cast in too classical a mold, and consequently wears a certain air of artificiality. His *Obras en Verso* (1582) were republished in the *Coleccion of* Ramon Fernandez (1786; new ed. 1808). His chief historical work is the *Relacion de la Guerra de Chipre* (1572); and he translated from the Latin of Stapleton a life of Sir. T. More.

HERRĒ'RA, FRANCISCO, EL VIEJO, i.e., the Elder; 1576–1656; b. Seville: one of the most eminent Spanish painters of the school of Seville. His drawing was bold and spirited; for which reason he may be regarded the founder of a new and more national school. His *Last Judgment* is a master-piece of drawing and coloring: *Holy Family*, and *Outpouring of the Holy Spirit*, also are much esteemed. The cupola of the church at Sta. Bonaventura displays his skill in fresco-painting. He died at Madrid. Some of his best works are in the Louvre at Paris. His youngest son, FRANCISCO HERRERA, EL MOZO (the Younger), 1622–85; b. Seville; studied under his father, and afterward went to Rome, where he became so celebrated for his fish-pieces, that he received the surname of *Il Spagnuolo degli Pesci*. After his father's death, he returned to Spain, where he painted church-pictures, domes, etc. He died at Madrid. There have been several other artists of the same name of less note.

HERRERA Y TORDESILLAS, *ĕr-rā'râ e tor-dā-sēl'yâs* ANTONIO DE: 1549–1625, Mar. 29; b. Cuellar. province of Segovia, Spain: historian; whose works, though not entirely well-arranged, are on the whole accurate and indispensable to a knowledge of the early Spanish American colonies and the aboriginal American peoples. His principal work is the *Historia general de los Hechos de los Castellanos en las Islas y Tierra Firme del Mar Oceano*, 1492–1554 (1601–15), afterward published with continuations by Andr. Gonzalez de Barcia (1728–30). His *Descripcion de las Indias occidentales* (1601, 15) forms an introduction to the above work. His other works are the *Historia del Mundo en el Reynado del Rey D. Felipe II.* (1601–12); *Commentarios de los Hechos de los Españoles, Franceses y Venecianos en Italia*, 1281–1559 (1624); and the *Historia de Portugal y Conquista de las Islas de los Açores*, 1582 *y* 1583 (1591). He died at Madrid.

HERRICK, *hĕr'ĭk*, ROBERT: 1591–1674, Oct.; b. in Cheapside, London: poet. He was educated at Cambridge, took his degree 1616, and became M. A. 1620; and 1629 was presented to the vicarage of Dean Prior, Devonshire. He had been, probably before 1613, the ornament of a circle of wits and dramatists in London. Ejected from his parish by the Long Parliament 1648, he repaired to London and published two volumes of poems, *Hesperides* and *Noble Numbers*. On the restoration of Charles II., he was reinstated in his old living, where he died. His sermons are said to have been 'florid and witty.' His poems, numbering 1,300, all short, and all lyrical, are graceful and melodious, and show much fine fancy. They vary in subject from amatory verses, sometimes indelicately expressed, to pieces of deep religious feeling. There is much rubbish; but Herrick stands unrivalled in his limited sphere of pastoral lyrical poetry. Such songs as *Cherry Ripe*, and *Gather the Rosebuds while ye may*, are universally known. The most complete edition of his works is that by the Rev. A. B. Grosart (London 1876).

HERRICK, ROBERT WELCH, American novelist: b. Cambridge, Mass., 1868, April 26. He was graduated at Harvard in 1890, and in 1895 became assistant professor of rhetoric at the University of Chicago. His literary style displays much finish, while his studies of character are both keen and discriminating. He has published: *The Man Who Wins* (1895); *Literary Love Letters and Other Stories* (1896); *Love's Dilemmas* (1898); *Composition and Rhetoric* (1899); *The Web of Life* (1900); *The Real World* (1901); *Their Child* (1903); *The Common Lot* (1904); *Memoirs of an American Citizen* (1905); etc.

HERRICK, SOPHIE MCILVAINE BLEDSOE, American microscopist: b. Gambier, Ohio, 1837, March 26. She was editor of the *Southern Review* 1875–8, and has since been connected with the editorial staff of *Scribner's Magazine* and its successor *The Century*. She has published *Wonders of Plant Life under the Microscope* (1883); *The Earth in Past Ages; Chapters in Plant Life; A Century of Sonnets* (1902); etc.

HERRING, n. *hĕr'rĭng* [F. *hareng;* OF. *harenc;* Ger. *häring;* AS. *hæring*, a herring—from AS. *here;* Ger. *heer*, a host, an army]: a well-known sea-fish. KING OF THE HERRINGS, a cartilaginous fish which follows shoals of herring, allied to the sturgeon; the chimæra. HERRING-BONE, applied to a kind of cross-stitch in seams; in *masonry*, when the stones are laid aslant instead of being bedded flat. HERRING SILVER, formerly, a sum of money paid instead of supplying a religious house with a certain number of herrings.

HERRING (*Clupea harengus*): fish of the malacopterous family *Clupeidæ* (q.v.); one of the most important of fishes to mankind. The genus *Clupea* is distinguished from other of the same family chiefly by the fins and by the teeth which are small and numerous, and are situated not only

on the jaws, but in other parts of the mouth, as the *vomer* (middle line of the palate) and the tongue. The herring is found in northern seas, but more abundantly in temperate than arctic regions. The opinion formerly held, that its proper home is within the Arctic circle, and that its vast shoals issue thence at certain seasons, migrating southward, and spreading themselves along the northern coast of Europe and America, is now utterly discarded; and the herring is believed to be an inhabitant of deep water, from which, at certain seasons, it approaches the shores, probably never migrating to any great distance. The young are abundant in the shallow water near the shores at seasons when the parent fish are absent. The herring seems always to deposit its spawn in comparatively shallow water, and is said to be very indifferent whether the spawning ground be sandy, rocky, or covered with submarine vegetation. Certain localities, however, have the reputation of being favorite spawning-grounds. When the great annual shoals of herrings appear on the coasts, they generally swim near the surface of the water, and are followed by multitudes of larger fishes, as hakes, dog-fishes, etc., which prey on them; great numbers also fall a ready prey to gulls and other sea-birds, which congregate for the occasion. The food of the herring is believed to consist chiefly of minute crustaceans and *acalephæ;* but it feeds also on small fishes, not scrupling to devour even the young of its own species. Herrings are sometimes, though rarely, caught on the lines set for other fishes, and by persons angling from the shor ; they are readily caught by means of a lure made of a white feather, which swims at the depth of some yards, the point of the fishing rod being kept a yard or two below the surface of the water, the angler being in a boat which is in motion. The immense multitudes of herrings annually taken by the net cause no apparent diminution of their abundance, the destruction being compensated for by prodigious fecundity; more than 68,000 eggs have been counted in the roe of a single female. But herrings, without any apparent cause, often desert parts of the coast where for a time they have been remarkably abundant, not returning again in plenty for a number of years. This has sometimes been popularly ascribed to steamboats. For recent observations and experiments as to the fertilization of herring ova, see *Nature,* XXIX. 538. The size of the shoals of herrings is often enormous, and they have sometimes even been driven ashore in far greater quantities than the inhabitants of the neighborhood could find means of curing. In some instances the water as the tide came in, has been so full of herrings, that half-a-dozen could be taken out at one dip of a basket; and the retiring tide left them stranded in vast numbers.

There is evidence that the herring-fishery has been prosecuted in England since the beginning of the 8th c., and in Normandy since the 11th; and it is probable that in both cases the beginning was at an earlier date. The prosperity of Holland has been in a great measure due to the herring-

fishery, and the Dutch engaged in it with great eagerness, and carried it on even on the British coasts, when it was comparatively neglected by English and Scotch.

The herring of the European and N. American coasts are of the same species. The seas of other parts of the world produced a number of other species of the genus *Clupea*, as now restricted by ichthyologists.

The fishes popularly called *Freshwater Herrings* are *Salmonidæ* of the genus *Coregonus* (q.v.), to which belong also the *Herring Salmons* of the N. American lakes and rivers. All are esteemed for the table. See Huxley in *Nature*, 1881.

HER'RING, VANCOUVER ISLAND (*Meletta cœrulea*): fish of the same family with the herring, and much resembling it in appearance and otherwise. The genus *Meletta* differs from *Clupea*, to which the herring belongs, chiefly in having no teeth, except that name may be given to a rough band on the tongue. The Vancouver Island herring abounds on the n.w. coast of N. America. It is generally about ten inches in length. Its color is bright steel blue, shading away on the sides to brilliant silvery white, the fins yellowish white. Immense shoals appear on the coast at different seasons from Feb. to July; often pursued by dogfish, so that fleeing from the enemy, they even rush upon the shore, where great numbers die among the pebbles. They afford a chief part of the sea-harvest of the Indians, who take them by various means—by the rake, such as is used for the Candle-fish (q.v.), for the shoals often so fill the water that it may be employed; by hand-nets; and by long dams of lattice-work, along the outside of great mud-flats left dry by the retiring tide. The spawn of this fish is also favorite food of the Indians, and is obtained by placing great quantities of fir branches in the mud over the flats, within the dams used for catching the herring. The spawn gets entangled among the branches and is removed to be dried in the sun. Great numbers of the herring caught by the Indians are used only for extraction of oil.

HER'RING-FISH'ERY: industry of great importance on the northern coast of America and Europe. It is carried on all the year round, there being both a winter and summer fishery; but the largest quantity of fish are caught in Aug. and Sep. (See FISHERY). The common mode of capturing herrings is by a set of large nets joined together, known among fishermen as a 'drift.' These nets, held together by a back-rope, are let into the water in a straight line, and are kept perpendicular by a number of bladders or cork floats, balanced by a few slight weights of lead. Each single net is composed of fine twine worked into meshes of an inch square, and is 50 yards long and 33 ft. in depth. These nets, now woven by machinery, were formerly made by the fisherman's families. Each boat has a train that extends nearly a mile in length. Another mode of fishing, sometimes used, known as 'trawling,' is in reality fishing with a 'seine'-net.

HERRING-FISHERY.

The herring generally considered the most important of food fishes, is distributed through the whole of the North Sea and the Atlantic, and the annual catch is estimated at 3,000,000,000, with a weight of at least 1,500,000,000 lbs. The herring was one of the most conspicuous fishes in the w. Atlantic at the time of the discovery and early exploration of America, and amusing reports were made concerning it by navigators as early as 1631. It is found in the temperate and colder parts of the North Atlantic. On the w. its range extends s. to Sandy Hook, where it is found occasionally in mid-winter; and on the n. as far as northern Labrador, preceptibly decreasing in number toward the n. extreme. On the e. its s. limit is in the vicinity of the Bay of Biscay, while n. it is found in the White Sea and on the s. shores of Spitzbergen. Though abundant in the North Sea and in the Baltic, it does not enter the Mediterranean. On the coast of the United States it is not known to enter water in the least degree brackish, except occasionally in the spawning season in St. Andrews' Bay. As far as is known, the abundance of herring in the w. Atlantic has been constant during the two past centuries. It spawns in the Bay of St. Lawrence in the spring, and spring spawning grounds are thought to exist in the Bay of Fundy, St. Andrews' Bay, and parts of Passemaquoddy Bay as well. The spawning season advances as one goes w. and s. The capture of herring is forbidden in the prov. of New Brunswick June 15—Sep. 15; the spawning season is at its height off New Brunswick and Nova Scotia at the beginning of Aug.; it occurs off Me. in Sept.; e. Mass. Oct.; Cape Cod, Nov.; No-Man's Land and Block Island, Dec.; and probably later further s. Owing to the great supply of other excellent food fishes in the United States, much less attention is paid to the capture of herring for food here than in Europe. By far the greatest consumption is in the shape of so-called 'sardines,' packed mostly in cotton-seed oil and in cans made in imitation of those imported from France. Fresh and salted herring are used extensively for bait in the halibut and cod fisheries, and a special night-fishery for young herring or *sperling*, is carried on in the autumn with torches about Cape Ann, for the supply of the shore fishermen. A species of herring—the *clupea mirabilis*—is found along the entire length of the Pacific coast, and is especially abundant in the north. All the bays and outlets of Puget Sound are filled with it in summer. It is seldom seen s. of Point Conception except in winter. It spawns in San Diego Bay in Jan.; is abundant in San Francisco Bay in the spring; and further n. the season is later. A second species—the *clupea sagax*—known also as the Cal. sardine, is almost identical with the European sardine, ranges from Cape Mendocino to Chili, is migratory along the coast, and is extremely abundant in the bays of the south in winter and scarce in summer. In American waters the alewife, sprat, brit, anchovy, menhaden, ocean trout, whitefish, mossbunker, and mountain trout are names, among others, applied to species of the herring family.

HER'RISON [Fr. *hérisson*]: in heraldry, the hedgehog. a charge allusively borne by families of the name of Harris.

HERRNHUT, *hĕrn'hût:* small town in the circle of Bautzen, kingdom of Saxony, about 50 m. e. of Dresden, pleasantly situated on the s. slope of the Hutberg, from whitch it takes its name. Pop. about 1,200. Herrnhut is noted throughout Germany for its fine and durable manufactures, particularly linen, japanned wares, and leather. It is remarkable also for the regularity and simplicity of its architecture, as are the inhabitants for cleanliness, simplicity of life and manners, and quiet deportment. Herrnhut was founded 1722 by a colony of persecuted Moravians, some of whom were descended from the old Bohemian and Moravian Brethren. On coming into Saxony, they were sheltered and protected by the pious Count Zinzendorf, to whom Herrnhut belonged. From this place the United Brethren, better known as Moravians (q.v.), have spread themselves over all parts of the world. The village of Berthelsdorf, about a mile from Herrnhut has been since abt. 1879, the seat of the directorate of the Moravian community.

HER'RON, Francis Jay, American solider: b. Pittsburg, Pa., 1837, Feb. 17; d. New York, 1902, Jan. 8. He was graduated at the Western University of Pennsylvania 1854, and on the breaking out of the Civil War commanded the Governor's Grays in the First Iowa regiment. In 1861 he was made lieutenant-colonel of the Ninth Iowa regiment. In 1862 he received the commission of brigadier-general of volunteers. Early in 1863 he joined Gen. Grant at Vicksburg and commanded the left wing of the besieging forces as major-general (1862), until the capture of the city. He subsequently captured Yazoo City, with its boats and supplies; commanded the Thirteenth army corps, and broke up the traffic along the Rio Grande, assisted President Juarez against Maximilian's forces, and in June, 1865 received the surrender of the Confederate forces west of the Mississippi. In 1873 he took up his residence in New York, where he practiced law until his death.

HERRON, George Davis, American clergyman and social reformer: b. Montezuma, Ind., 1862, Jan. 21. He was educated at Ripon College, Wisconsin, and also studied in Europe. He became pastor of the Congregational Church in Lake City, Minn., and while there made an address (The Message of Jesus to Men of Wealth) before a Minneapolis club, which attracted much attention; he subsequently received a number of calls from important churches, and went as pastor to Burlington, Ia. Here he organized a club for the discussion of social questions, which was largely attended, especially by workingmen. In 1893 he accepted the chair of applied Christianity at Iowa College, resigning in 1900 on account of the objection to his teachings; he then organized a religious and socialist

movement known as the 'social crusade.' In 1901 he divorced his wife and married a second time, an action which aroused much criticism. He has written: *The Larger Christ* (1891); *The Call of the Cross* (1892); *A Plea for the Gospel* (1892); *The New Redemption* (1893); *The Christian Society* (1894); *The Christian State* (1895); *Social Meaning of Religious Experiences* (1897); *Between Cæsar and Jesus* (1899); *Why I am a Socialist* (1900); *From Revolution to Revolution; The Day of Judgment; Wagner and Parsifal* (1903); etc.

HERSCHEL, n. *hĕr'shĕl:* the planet discovered by Sir William Herschel, now called *Uranus.* See PLANETS.

HERSCHEL, *hĕr'shĕl,* CAROLINE LUCRETIA: astronomer: 1750, Mar. 16—1848, Jan. 9; b. Hanover, sister of Sir Frederick William Herschel (q.v.). She lived in Hanover till 1772, when she went to England to live with her brother at Bath. Her early education had been very deficient; later she had learned millinery and dressmaking that she might maintain herself. When William turned astronomer, she became his constant helper; and on his being appointed private astronomer to George III., she acted as his assistant, doing all the duties of an assistant astronomer, and in that character receiving a small salary from the king. While discharging her duties in this position, she found time for a series of independent observations with a small Newtonian telescope, made for her by her brother. Her special business was to sweep the heavens for comets, seven of which she discovered, in regard to five of which she has the credit of priority of discovery; and several remarkable nebulæ and clusters of stars included in Sir William's catalogues were described from her original observations. In 1798, she published, with introduction by her brother, *A Catalogue of Stars taken from Mr. Flamsteed's Observations,* etc. This valuable work, published at the expense of the Royal Soc., contained 561 stars omitted in the British catalogue. She lived with her brother during his whole career, sharing his labors and distinctions; and at his death returned to her native country. She was then 72 years of age, but she lived to be 98, retaining all her faculties to the last. In her last days, she was not idle. In 1828, the Royal Soc. conferred on her their gold medal for completing the catalogue of nebulæ and clusters of stars (2,500) observed by her brother. She was afterward chosen an honorary member of the Royal Society. In 1846 she received a gold medal from the king of Prussia. See her *Memoir and Correspondence* (1876).

HERSCHEL, *hĕr'shĕl,* Sir FREDERICK WILLIAM, D.C.L. (generally known as Sir William Herschel): illustrious astronomer: 1738, Nov. 15—1822, Aug. 23; b. Hanover; son of a musician who played the oboë in the band of the Hanoverian Guard. He was educated specially as a professional musician. In 1757 he went to England, was teacher of music in Leeds, whence he went to Halifax as organist,

and subsequently (1766) in the same capacity to Bath. Here he seems first to have turned his attention to astronomy. Wanting a telescope, and unable to afford a reflector, he made one for himself—a Newtonian, of five ft, focal length, and with this applied himself to study the heavens. In 1781, he made his first discovery (*Philos. Trans.* 1780–1), being a new planet, which at first he took for a comet. It was detected by an exhaustive process of surveying the heavens, which Herschel was the first to follow, taking the stars in regular series, and examining them all in their groups through the same instrument. The result of his discovery was his appointment to be private astronomer to George III., with a salary of £400 a year. He then went to live at Slough, near Windsor, where, assisted by his sister Caroline (q.v.), he continued his researches. Herschel married Mrs. Mary Pitt, and left one son, John Frederick William Herschel (q.v.). Little is known of his private life. He was knighted by George III., and made D.C.L. by the Univ. of Oxford; he became rich partly through his wife's jointure, and partly through selling mirrors for reflecting telescopes. He died at Slough.

Herschel contributed 69 papers to the *Philos. Trans.* 1780–1815; and to vol. I. of *Mem. of the Astron. Society*, he contributed a paper, 'On the Places of 145 New Double Stars.' He greatly added to the knowledge of the solar system; he discovered Uranus and its six satellites, and two satellites of Saturn. Besides this, he detected the rotation of Saturn's ring, the period of rotation of Saturn itself and that of Venus, the existence of the motions of binary stars, the first revelation of systems besides our own. He threw new light on the Milky Way and the constitution of nebulæ, and in fact, his sublime speculation as to the construction of the stellar heavens, first brought to the human mind any conception of the immensity of the universe. His catalogue of double stars, nebulæ, etc., and tables of comparative brightness of stars, and his researches in regard to light and heat, would of themselves entitle him to the first rank as an astronomer and natural philosopher. His absorbing devotion to his high pursuit, and his indomitable perseverance against all obstacles, led to achievements which make his name illustrious in the history of science. His sister's name must hold place with his. For a notice of Herschel's telescope, see TELESCOPES. He erected one immense telescope of 40 ft. length; it was begun 1785, finished 1789, in which year he by means of it detected the sixth satellite of Saturn. See Herschel's *Life and Works*, by E. S. Holden, 1881.

HER'SCHEL, Sir JOHN FREDERICK WILLIAM, Bart., D.C.L.: illustrious astronomer: 1792–1871, May 11; b. Slough, Bucks; only son of the astronomer, Sir FREDERICK William Herschel (q.v.). He was educated at St. John's Cambridge, where, 1813, he became senior wrangler and first Smith's Prizeman. His first publication was *A Collection of Examples of the Application of the Calculus of Finite Differences* (1820). In 1822, he applied himself especially

to astronomy, using his father's methods and instruments. For a time, he worked with Sir James South in re-examining the nebulæ and clusters of stars described in his father's catalogues. The results of the re-examination were given 1833 to the Royal Soc. in the form of a catalogue of stars in order of their right ascension. The catalogue contained observations on 525 nebulæ and clusters of stars not noticed by his father ,and on a great number of double stars—in all between 3,000 and 4,000. This important contribution to science led to his being acknowledged as the worthy successor of his father; so early, indeed, as 1826, the Royal Soc. had voted to him and South a gold medal apiece for their observations on double stars; but by 1833 his pre-eminence was beyond the necessity of being marked by acknowledgments. His *Treatise on Sound* had appeared in the *Ency. Metro.* 1830, and his *Treatise on the Theory of Light* (in the same work) 1831, in which year also appeared in Lardner's *Cyclo.* his well-known *Preliminary Discourse on the Study of Natural Philosophy*, not to mention his papers in the *Trans. Astron. Soc.* The *Preliminary Discourse*—one of the most charmingly written books on science in any language—contributed largely to his popularity. In 1836, appeared his *Treatise on Astronomy* in Lardner's *Cyclo.* At this time Herschel was at the Cape of Good Hope, where he arrived 1834, Jan., with the intention of completing the survey of the sidereal heavens, by examining the southern hemisphere as he had examined the northern. Here he established his observatory at a place called Feldhausen, six miles from Table Bay. 1834, Mar. 5, he commenced his observations, and in four years, working all the time at his own expense, he completed them. The public interest in his labors was very great; but though now and then gratified by partial statements of his results, it was not till 1847, nine years after his return from the Cape, that it received full gratification in the publication of a vol. of *Results of Astronomical Observations made during* 1834–38 *at the Cape of Good Hope; being the Completion of a Telescopic Survey of the whole Surface of the Visible Heavens commenced in* 1825. The results of these labors are invaluable. They are now incorporated into all books on astronomy. Herschel, when at the Cape, gave an impulse to the science of meteorology, having the merit of having suggested the scheme for taking meteorological observations simultaneously at different places. In 1844, he published, under official military authority, a book of instructions for taking and recording such observations in southern Africa.

On his return to England 1838, honors were showered on him. He was made a D.C.L. of Oxford; on Queen Victoria's coronation, he was created a baronet; he succeeded the Duke of Sussex as pres. of the Royal Soc.; 1847, he became pres. of the Royal Astronomical Society. In 1849, he published *Outlines of Astronomy*. In 1850, he was appointed master of the mint. This office, on account of ill health, he resigned 1855. After his death appeared his *Catalogue of* 10,300 *Multiple and Double Stars*.

HERSCHELL, Lord Farrer: an English lawyer; 1837, Nov. 2—1899, March 1; b. in England; was graduated at London University, of which he afterward became chancellor; later studied at the University of Bonn; became a barrister of Lincoln's Inn, 1860; queen's counsel, 1872; bencher of Lincoln's Inn, 1872; recorder of Carlisle, 1873–1880; and solicitor-general, 1880–85. He was knighted in 1880; raised to the peerage and became lord high chancellor in 1886; and again lord high chancellor, 1892. In 1897 he was appointed a member of the Venezuela and British Guiana boundary arbitration tribunal. During the sitting of the commission in Washington, D. C., 1899, Feb., he had a severe fall, from the effects of which he died. A British warship conveyed his remains to England.

HERSE, n., or Hearse, *hĕrs* [F. *herse*, a harrow—from OF. *herce*—from It. *erpice*—from mid. L. *hirpĭcĕm*, a harrow]: lattice or porticullis in the form of a harrow set with iron spikes for the reception of candles: thence a frame of light wood-work similarly set with spikes for candles, which was used at the ceremonies of the church, and set up over a corpse at funeral services. It was originally very simple in form, but in the 15th and 16th c. herses of great splendor came into use, and were erected in the churches over the bodies of distinguished personages. The framework then was of iron or brass, sometimes of beautiful workmanship, square, octagonal, etc., in plan, with pillars at the angles, and arched framework above forming a canopy. The whole was hung over with rich cloths and embroidery, and lighted with hundreds of wax candles, and decorated with wax images. From this the transition to the modern funeral herse (see Funeral Rites) can be easily traced.

HERSILLON, n. *hĕrs'ĭl-ŏn* [F.]: in *fort.*, beam, frame or plank set with spikes to stop a breach or way; a herse; a cheval-de-frise (q v.).

HERTEL, *hĕr'tĕl*, Albert, German painter: b. Berlin, 1843, April 19; studied at the Berlin Academy, where he became professor in 1875, and was made a member in 1901. Among his landscapes are *Olive Harvest in Capri* (1872); *After the Storm on the Coast of Genoa* (1878); *Road Between Rapalla and Santa Margherita* (1892); and *View in the Roman Campagna* (1896).

HERTEL DE ROUVILLE, *ăr-tĕl dė roo-vēl*, Francis, Canadian soldier: b. Three Rivers, Maurice County, Quebec, 1643; d. 1722. He was captured in 1681 and tortured by the Iroquois who were so struck by his fortitude that they adopted him into their tribe, from which he escaped and as one of Frontenac's lieutenants performed some remarkable exploits against the English from whom he captured Falmouth, now Portland. Louis XIV. tardily rewarded him with a patent of nobility.

HERTER, Albert, American artist: b. New York, 1871, Mar. 2. He studied painting at Paris in the studio

of Jean Paul Laurens. He has twice visited Japan and the years spent there have strongly influenced the character of his work. He is member of the Society of American Artists, of the Water Color Club, and of the Water Color Society.

HERTHA, *hĕr'tha*, or HERTHUS, *hĕr'thŭs*, or ÆRTHA, *ĕr'tha:* one of the ancient German goddesses, from whose name doubtless is derived the modern German *erde* and English *earth*. Tacitus records her worship by the Suevi, and that her temple was on an island in the ocean. This isle of Hertha was long supposed to be the island of Rugen; but is now conjectured by some scholars to be Heligoland, and by others Zetland.

HERTOGENBOSCH, or HERZOGENBOSCH. See BOIS-LE-DUC.

HERTZ, HEINRICH, German physicist: b. Hamburg, 1857, Feb 22; d. Bonn, 1894, Jan. 1. He studied at the Univ. of Berlin, and in 1880 became assistant to Helmholtz there. In 1883 he was lecturer on theoretical physics at the Univ. of Kiel; in 1885 was professor of physics at a technical school in Karlsruhe; and in 1889 succeeded Clausius as professor of physics at the Univ. of Bonn. His most important work was his experiments with electricity, by which he proved that electricity can be transmitted in electromagnetic waves with the same rapidity as light, these waves showing the same phenomena of refraction, polarization, etc., as light waves. He thus further developed and attested the truth of Faraday's electro-magnetic theory of light. It is by means of the Hertzian waves also that wireless telegraphy (q.v.) is made possible.

HERTZ, *hĕrts*, HENRIK: Danish poet: 1798, Aug. 25—1870, Feb. 25; b. Copenhagen; of Jewish parents. In 1832, he abjured Judaism, and joined the Prot. Church. His first appearance as an author was 1827, when he produced several clever vaudevilles and comedies, as *Kjerlighed og Politi*, *Hr Burchardt og hans Familje*, *Flyttedagen*, etc.; three years later, appeared his *Gjengangerbreve eller poetiske Epistler fra Paradis*, which exhibited such wonderful powers of imitating the style and spirit of other writers, more especially those of his countryman Baggesen, that public attention was at once arrested. Hitherto, he had written anonymously, but the masterly manner in which he had stigmatized the affectations and puerilities which had perverted the literature and criticism of the Danish press, produced a ferment in the literary circles of Copenhagen, which soon led to the discovery of the unknown writer. From this time his works followed in rapid succession; and in an entirely different path from the one on which he had first entered, he produced, 1837, a dramatic poem, *Svend Dyring's Huus*, founded on an old heroic saga, which his countrymen deem his masterpiece; among Germans, however, his lyrical drama of *Kong René's Datter* (1854) is his most popular work. He has a place in the front rank of Danish lyrical poets.

HERTZEN (or HERZEN), *hert'sĕn*, ALEXANDER, 1812—1870, Jan. 21; b. Moscow: Russian author. In 1835, while yet a student, he was imprisoned for his political opinions, and banished. After 1842, he was permitted to reside at Moscow, under strict surveillance of the police, and applied himself exclusively to literary labors. After 1847, he resided some time in London. In his own country, Hertzen's life was one long petty persecution. Hertzen's literary performances are *Dilettantism in Science* (1842); *Letters on the Study of Nature* (1845–46); *Whose Fault is it?* and *Doctor Kroupof* (both in 1847); *Recollections of My Travels* (1848); *On the Development of Revolutionary Ideas in Russia* (1851); *Baptized Property* (1853); or 'Serfism,' *Prison and Exile* (1854); *My Exile* (1855); *Interrupted Tales* (1856); *France or England* (1858); *Memoirs of Catherine II.* (1859); *The Old World and Russia, The New Phase of Russian Literature* (1864). In 1865 he took up his residence at Geneva. Hertzen had at one time an immense reputation as a political writer. He died in Paris.

HERULI, *hĕr'ū-lī*, or ÆRULI or ERULI: warlike tribe of Germans known first as inhabiting the n. shore of the Euxine Sea. They joined the Goths in their incursions against the Danubian provinces of the Roman empire in the latter part of the 3d c.; were conquered by the Ostrogoths under Hermanric early in the 4th c.; accompanied Attila, King of the Huns, in his descent on Gaul; and after the defeat of the Huns established confederacies in the valley of the Theiss, on the Lower Danube, and in Illyria. Subsequently they united with other German tribes, and under the leadership of Odoacer assisted in the overthrow of the Western empire 476. After a brief period of tribal prosperity and importance, they attempted to subjugate the Lombards, but the latter rose and nearly annihilated them 512. The survivors were dispersed and ultimately merged into other nations.

HERVEY, *her'vi*, JAMES: 1713, Feb. 26—1758, Dec. 25; b. Hardingstone, Northamptonshire, England: clergyman and author. He was educated at Oxford Univ., took holy orders 1737, was appointed curate to his father, and on his death 1752 succeeded to his livings of Wiston Favel and Collingtree. While at Oxford he became intimate with John Wesley and familiar with Zimmerman's writings, and for a time inclined to their theology; but later adopted the Calvinistic creed and determined to adhere to the Established Church. He was author of numerous religious works, chief of which were *Meditations and Contemplations* (1746–7); *Remarks on Lord Bolingbroke's Letters on History* (1755); *Theron and Aspasia*, religious dialogues (1755) and *Letters to John Wesley* (posthumous). His writings, formerly popular with a class of religious readers, are now little read: they deal with sombre themes and though conceived in a good spirit give an impression of unnaturalness.

HERVIDERO, n. *hĕr'vĭ-dā'rō* [Sp. *hervidero*, ebullition —from *hervir*, to boil]: the name given in Central America to the mud-volcanoes.

HERZ, *hĕrtz*, Henri: pianist and composer for the pianoforte: b. 1806, Vienna; d. 1888, Jan. 6. He was educated principally in Paris, where his talent was early recognized; and his compositions became popular over Europe. He was received with great applause in England 1834, and America 1846. In 1837, he received the decoration of the Legion of Honor; and, 1843, became prof. of music at the Conservatoire. In 1865 he published in the *Moniteur Mes Voyages en Amérique*. He also carried on the business of a piano manufacturer. Herz's music is characterized by elegance and a certain originality.

HERZEL, *hĕr'zĕl*, Theodor, Jewish leader of political Zionism: b. Budapest, 1860, May 2; d. 1904, July 3. He was educated in Vienna for the law, but devoted himself almost exclusively to journalism and literature. He was at first Paris correspondent and later literary editor of the *Neue Freie Presse*, and wrote comedies and dramas. In 1896 he published his *Judenstaat*, the English translation of which *A Jewish State* made him the political leader of the Zionist movement; and his efforts were at once centered in this propaganda. *Die Welt* of Vienna was established by him in 1897, and in that year he planned and was elected president of the first Zionist Congress held at Basel. At every subsequent congress (the sixth having been held in August 1903) he was unanimously re-elected. In 1898 he inaugurated a series of diplomatic interviews with various sovereigns and statesmen. At the Hague Peace Conference he was received by many of the delegates. In the Zionist movement he was officially the chairman of the Grosses Actions Comité, and of the Vienna executive committee, and a member of the council of administration. Among his further works are: *Das Neue Ghetto* (1903), directed against the Jewish element that combated his views; *Altneuland* (1903), a fictional presentation of Zionistic ideas.

HERZOG, *hĕr'tsōch*, Johann Jakob, D.D.: 1805, Sep. 12 —1882, Sep. 30; b. Basel, Switzerland: theologian. He studied theol. in Basel and Berlin 1823–29, was prof. of historical theol. at Lausanne 1835–45, at Halle 1847–54, and Erlangen 1854–77, and then retired to apply himself wholly to authorship. His published works comprise *J. Calvin* (1843); *Das Leben Œkolampadii*, 2 vols. (1843); *De Origine Valdensium* (1848); *Die Romanischen Waldenser* (1853); *Real-Encyklopädie für Protestantische Theologie*, 22 vols. (1854–68), and *Outline of Church History*, 3 vols. (1876–82). At the time of his death, he was bringing out a revised ed. (begun 1877) of his great *Real-Encyklopædie*, a work of great research and high value. A condensed American ed. was published by Philip Schaff, D.D. 1882–3.

HESIOD, *hē'sĭ-od:* next to Homer the earliest Greek poet of whom we have any knowledge: probably nine cen-

turies before Christ; b. at Ascra, in Bœotia, whither his father had emigrated from the Æolian Kyme, in Asia Minor. He seems to have been at first a peasant or herdsman in humble circumstances: in his *Works and Days*, he speaks of himself as *atimētos*, 'unhonored,' 'noteless.' He afterward left Ascra, and went n. to Orchomenos, on Lake Copais, where he dwelt during the remainder of his life, and where in later times his tomb was shown. This is really all we know about Hesiod, for the marvellous stories of the Neo-Platonists give no intelligible clue to his personal history, and, in the opinion of some critics, even throw grave doubts on his historical reality altogether; though this is probably too extreme a view. But while it may not be necessary to reject the personality of Hesiod, it may still be allowed that he was a 'representative man,' the founder and head of a school of poets—the Bœotian or Pierian—in striking contrast with the older Ionic or Homeric school. Their original region was at the foot of Mount Helicon whence they spread over Bœotia, Phocis, and Eubœa Their language and versification were nearly the same as those of the Homeric school, but in all other respects, they appear to have been different, and even antagonistic, ignoring the sanguinary struggles of the heroic age, and preferring to sing of rural quietude, and peaceful pursuits, the simple household life, the homely duties of thrift, the education of children, and the prosaic details of commerce and politics. Hence the Spartan, Cleomenes, scornfully termed Hesiod the 'poet of helots,' while Homer was the poet of warriors. In fine, it may be said that the poetry of the Hesiodic school indicates an advance in civilization, morality, and thought, on the Homeric school.—The works either written by or ascribed to Hesiod are seven, of which the following are the more important: 1. *Erga kai Hemerai* ('Works and Days'), in the time of Pausanias, the only one considered to be truly Hesiod's by the people about Mount Helicon; 2. *Theogonia* ('Generation of the Gods'), not considered genuine by Hesiod's countrymen, nor by most modern critics; 3. *Eoiai* or *Eoiai Megalai*, called also *Katalogoi Gunaikōn* ('Catalogues of Women'). Of these the first two are entire; while the well-known *Aspis Herakleos* ('Shield of Hercules') is supposed by some to be a relic of the third. The Hesiodic poetry was, in ancient times, if not warmly admired, at least held in veneration. Both the priesthood and the philosophers considered the *Theogony* a great—in fact, the greatest authority—on the subjects of which it discourses; and almost all the great Alexandrine critics earnestly labored in its elucidation, but their commentaries have perished. Only here and there among the *Scholia* of the later Neo-Platonists some of their remarks are preserved. The most complete collection of these is in Gaisford's *Poetæ Græci Minores*. The first ed. of the Hesiodic poems appeared at Milan 1493; subsequent editions are those of Heinsius (Amsterdam 1667), of Robinson (Oxford 1737), of Loesner (Leips. 1778), Gaisford, Göttling (1831), Schömann (1869), Köchly (1870), and Flach (1874).

HESIODIC, a. *hē-sĭ-ŏd'ĭk:* contained in, resembling, or connected with the poems of Hesiod.

HESITATE, v. *hĕz'ĭ-tāt* [L. *hæsĭtātus*, undecided, hesitated: F. *hésiter*]: to pause respecting decision or action; to be in doubt; to delay; to waver; to stammer in speech. HES'ITATING, imp.: ADJ. pausing; stammering. HES'ITATED, pp. HES'ITA'TION, n. *-tā'shŭn* [F.—L.]: doubt; suspense of opinion or decision from uncertainty how to act. HES'ITATINGLY, ad. *-lĭ.* HES'ITANCY, n. *-tăn-sĭ*, a pausing to consider; suspense.—SYN of 'hesitate': to pause; demur; doubt; scruple; falter; stammer; deliberate; stop; waver; fluctuate.

HESPER, n. *hĕs'pĕr* [L. *Hespĕrus;* Gr. *Hespĕros*, Hesperus]: the evening star. HESPE'RIAN, a. *-pē'rĭ-an*, western; situated at the west. HESPER'IDES, n. plu. *-pĕr'-ĭ-dēz*, in *anc. myth.*, the daughters of Hesperus, possessors of the fabulous garden of golden apples, guarded by a dragon: the golden apples were those which Hera had received, on her marriage with Zeus, from Ge. The genealogy of the Hesper as well as their number, are variously given by mythologists. The locality of the gardens was also in dispute, the two favorite opinions placing them w. of Mount Atlas, and n. of the Caucasus. The apples were stolen by Hercules (q.v.), but were afterward restored by Athena. HES'PERID'IUM, n. *-pĕr-ĭd'ĭ-ŭm*, an indehiscent many-celled fruit coated with a spongy rind, the cells containing a mass of pulp, in the midst of which a few seeds are embedded, as in the orange.

HESPERIA, n. *hĕs-pēr'ĭ-a:* in *entom.*, typical genus of the family *Hesperidæ*, a family of *Rhopalocera* (butterflies). The species fly with extreme rapidity.

HESPERORNIS, n. *hĕs-pĕr-awr'nĭs* [Gr. *hesperis*, western; *ornis*, a bird]: fossil bird, typical of the order *Odontolcæ*, sub-class *Odontornithes*. *H. regalis*, has been described by Prof. Marsh from the Cretaceous rocks of N. America. It resembles a diver, Colymbus, but has teeth in its jaw, and only rudimentary wings.

HESSE, *hĕs*, or HESSIA (Ger. *Hessen*): territory of Germany occupied in ancient times, by the *Catti* or *Chatti*, who became known to the Romans A.D. 15, when Germanicus destroyed their principal settlement of Mattium, the site of the present villages of Gross and Klein Maden, near Gudensberg. In the course of time, the Catti, who were settled in the districts now known as Upper and Lower Hesse, gradually merged in the Frankish tribes, with whom they took part in the great emigration into Belgium and Gaul, after which the territories which they had evacuated were occupied by Saxons, who thenceforward kept possession of the land known in after ages as Saxon Hesse. The power of the chiefs had in the meanwhile become so firmly established under the Frankish empire that on the fall of the Carlovingians, 911, Conrad I., Duke of Franconia and Hesse, was elected to the vacant throne of Germany, as being the most powerful of the princes of the

empire. The various branches of the Hessian family still extant are descended from Heinrich I., surnamed the Child (died 1306), son of Sophie Duchess of Brabant. Although he himself exercised little real power, owing to the dismemberment of Hesse into numerous semi-independent principalities, his descendants gradually reunited these disjointed domains, and added many valuable territories on the Rhine to their old patrimony. Philip I., the Magnanimous, who succeeded his father, Wilhelm II., as a minor, 1509, introduced the Reformation into Hesse and founded the Univ. of Marburg with the revenues of the secularized convents and monasteries. This prince was active in the peasant and religious civil wars of his day, and, by a will made 1562, divided his territories among his four sons, who succeeded to their allotted possessions at his death, 1567. The eldest, Wilhelm IV., obtained the half of the Hessian domains, with Cassel for his residence; Ludwig, a fourth part, with Marburg; Philip, an eighth part, with Rheinfels; and George, an eighth part, with Darmstadt. The death of Philip and Ludwig left all the Hessian dominions in the two main lines of Hesse-Cassel and Hesse-Darmstadt, (q.v.)

HESSE-CASSEL, *hĕs-kâs'sĕl*, or Electoral Hesse, *ē-lĕk'tĕr-al hĕs* (Ger. *Hessen-Kassel*]: formerly an electorate of the Germanic Confederation, consisting of one large and five smaller districts, including the countship of Schaumburg and Schmalkald, a part of Henneberg, and Barchfeld, with various townships, impacted within the territories of other states. In consequence of the occurrences of 1866, it was annexed to Prussia Sep 16 of that year; and, 1868, Dec , went to form a part of the new province of Hesse-Nassau, which embraces, besides Hesse-Cassel, the greater part of Nassau (q.v.), part of Hesse-Homburg, and the Frankfurt territory. Pop. (1900), 1,897,981.

Physical Character —The country generally is hilly, in some places even mountainous, forming a part of the great central elevated plateau of Germany. The principal ranges are the Habichtswald, the Thüringerwald, of which the greatest elevation is the Inselberg (2,930 ft.), the Meissner (2,350 ft.), the Hündsrück, Kellerwald, and Rheinhardwald.

The principal rivers are the Werra, with numerous small. affluents, but which belongs only in part to Hesse-Nassau; the Fulda, whose course appertains almost exclusively to the province; the Edder, Weser, Main, and Lahn.

Climate, Soil, Products —The climate is generally mild, but in some mountainous districts, as the Rhöngebirge, it is at times severe. The mean annual temperature is 48° 5′ Fahrenheit. The soil is almost everywhere fruitful and adapted to agriculture. Cereals of all kinds yield good returns. The most cultivated districts are in the s.w. of Hanau, where much fruit and some good wines are produced. Flax is grown in Schaumburg and Lower Hesse, and tobacco in the valleys of the Werra. The mineral products comprise copper, lead, cobalt, vitriol, alum, clay,

large quantities of iron, coal, and salt, the last three of which are the property of the state.

Industry, Imports, and Exports—Trade —In addition to agriculture and the rearing of cattle and other animals, the chief branches of industry are the weaving of linen and yarn, which, though everywhere practiced, is prosecuted with most vigor about Fulda and Marburg. There are good steel and iron works at Schmalkald, and manufacturies of guns at Cassel, and porcelain, glass, paper, and gold and silver wire-works in Hanau and other parts of the province. The exports consist principally of yarn and linens, iron and steel wares, fine clay, wood, leather, grain, dried fruits, and mineral waters.

Education — There are, besides numerous national schools, numerous gymnasia, and various arts, polytechnic, theological, military, and other schools Hesse-Nassau has one university at Marburg, memorable as being the first which was founded after the Reformation, and without papal authority (1527).

Law — The supreme court of appeal is at Cassel, with two high courts of justice at Cassel and Fulda under whose jurisdiction are various criminal and magisterial courts.

Electoral Hesse was formerly a limited monarchical government. The ruler bore the title of Electoral Prince and Landgraf of Hesse, Grand Duke of Fulda, Prince of Hersfeld, Hanau, Fritzlar, and Isenburg, Count of Katzenellenbogen, Dietz, etc. The dignity, hereditary in the male line only, is at present held by the elector Frederick Wilhelm I. The elector was assisted in the government by a council of ministers, who were partially responsible. A new constitution, based on the federal decision of 1857, was promulgated 1860, providing for two representative chambers. Hesse-Cassel occupied the eighth place in the German Confederation and had three votes in the *Plenum* or general council of the diet.

History. — Hesse-Cassel is the elder line of the House of Hesse, founded by Landgraf Wilhelm IV., or the Wise, son of Philip the Magnanimous (reigned 1567–92), who held his court at Cassel. Wilhelm was succeeded by his son Maurice, who joined the Prot. Church, and five years before his death resigned the government 1627 to his son Wilhelm V. The latter fought on the side of Sweden during the Thirty Years' War, for which he was put under the ban of the empire. His two brothers, Hermann and Ernest, respectively founded the lines of Hesse-Rotenburg and Hesse-Rheinfels; and on his death 1637, his widow assumed the regency for their young son, Wilhelm VI., and, by her ability, secured for him, as an indemnification for the losses which the country had sustained during the war, the greater part of Schaumburg and the principality of Hersfeld. The successors of Wilhelm V. pursued the practice that he had begun of hiring out Hessian soldiers to fight in the service of foreign princes, a practice by which the finances of the state were considerably aug-

mented at the expense of the welfare and morality of the people; while, in some instances it led to the formation of important alliances on the part of the reigning house. The landgraf, Friedrich I., who succeeded his father 1730, had become king of Sweden 1720, in right of his wife, Princess Ulrike Eleanor, sister of Charles XII. His brother, Wilhelm VIII., to whom he had resigned his Hessian territories, fought under the British and Hanoverian flag in the Seven Years' War, and gained renown for himself and his troops during the war, which was especially disastrous to the welfare of his states. Wilhelm's son, Friedrich II., persevered in the same course, and kept up a splendid court on the proceeds of the pay, amounting to £3,000,000, which the British government gave him for the services of the 22,000 Hessians who fought against the Americans in the war of independence. Friedrich, who had become a convert to the Rom. Cath. church, died 1785, and was succeeded by his son, Wilhelm IX., who reigned as Wilhelm I., after his elevation to the rank of an elector 1803. This prince frequently shifted sides and parties during the French revolutionary and imperial war, fighting with his Hessian mercenaries first under British colors, then in conjunction with Prussia, and in 1806 as the ally of Napoleon, who in return for his aid promised to respect the neutrality of the electorate. After the battle of Jena, the French emperor, suspecting the motives which had actuated the elector in augmenting his army, threw troops into the Hessian territory, and at the peace of Tilsit incorporated the electorate in the newly formed kingdom of Westphalia. In 1813, Wilhelm returned to his dominions after the overthrow of French power in Germany, and at once began to restore the old order of things as far as he could; while he entered on a course of vexatious litigation to recover the state lands that had been sold during his exile, and appealed to the diet with such importunate pertinacity for indemnification, that he obtained various important concessions at the congress of Vienna, though he failed in his wish to secure the title of king, of which he was especially ambitious. In accordance with the promise which he had made his subjects on his restoration to power, he summoned a body of jurists to construct a constitution; but no sooner was a draft of this new scheme completed, than he refused to fulfil his promises. His death 1821 was regarded as fortunate for the electorate; but his son and successor, Wilhelm II., by his narrow policy, increased the rapidly growing disorders of the state, while his relations to his mistress, the obnoxious Countess of Reichenbach, rendered him peculiarly unpopular with his subjects. These disorders were partially arrested by the retirement of the elector 1831, and the nomination of the electoral prince to the rank of regent. But the history of the 16 years' regency of Prince Friedrich Wilhelm exhibits only a series of intrigues at court, dissensions between the government and the representatives of the people, and a retrogressive policy, which left Hesse-Cassel far behind other German

states in material prosperity. The death of the old elector at Frankfurt, whither he had retired on his abdication, raised the regent 1847 to the rank of sovereign elector. The revolution of Paris, 1848, extorted from the terrified prince many liberal promises of reform, some of which were redeemed; but in 1850, after revoking many of his pledges, he summoned the obnoxious Hassenpflug and Haynau to govern the country. Hassenpflug's measures at length drew on him a public charge of maladministration and treason; and he having persuaded the elector that his personal safety would be endangered if he remained longer among his subjects, the prince and his minister fled by night from Cassel to Wilhelmsbad 1850, Sep. 17, an ordinance proclaimed that the seat of government had been transferred to the latter place. Hassenpflug appealed to the Confederation for its intervention, and Hesse-Cassel became the rendezvous of troops; the Austrian and Bavarian contingents occupying the south, and the Prussians, apparently for the protection of the people against the elector, taking their position in the north. The threatened war was principally limited to angry protocols, but the result of the intervention was the restoration of the elector, who returned to Cassel. In 1852, a new constitution was promulgated, which in no way satisfied the people, whose conduct throughout the trying crisis had been marked by forbearance and moderation. But the policy of the government remained unchanged. In 1860, Oct., on the assembling of the chambers, a resolution was agreed to for addressing the elector, requiring the restoration of the constitution of 1831; but not till 1862, after much agitation and the interference of Prussia and Austria, did the elector so far accede to their wishes as to recognize the constitution of 1831, with the modifications of 1849. In the war between Austria and Prussia, Hesse-Cassel having sided with the former, a Prussian army entered the electorate, and it was ultimately annexed to Prussia 1866, Sep. 20.

HESSE-DARMSTADT, *hĕs-dârm'stât*, or HESSEN, *hĕs'-sĕn* (actual Hesse of the present day): a grand-duchy of Germany, extending (exclusive of small outlying portions) 49° 24′—50° 10′ n. lat., and 7° 50′—9° 10′ e. long., and consisting of two nearly equal parts, separated by a strip of land belonging to Hesse-Nassau. The n. district is mountainous, being intersected by the Vogelsberg, and branches of the Taunus and Westerfeld; the s. is level, except in the e., which is occupied by the Odenwald range. Total area, 2,965 sq. m. Pop. (1900) 1,119,893.

Physical Character. — Hesse-Darmstadt, which presents a succession of fruitful valleys and rich mountain slopes, is well watered, being traversed by the Rhine and Maine, Neckar, Nahe, Lahn, Nidda, Edder, Nidder, and Wetter. The climate of the n. districts of Hesse-Darmstadt is very much more severe than that of the s. or Starkenburg district, which shares the climate of s. Germany.

Agriculture is in a very flourishing condition, nearly half of the soil being arable lands. Corn is grown in sufficient

quantity for exportation, chiefly in Upper Hesse, where Indian corn, or maize, and flax, also are largely cultivated, while hemp, tobacco, and poppies are raised in Rhenish Hesse. The s. districts, in which a great variety of fruit is grown, including figs, almonds, chestnuts, etc., are specially noted for the excellence of their wines, the choicest of which are the Niersteiner, Laubenheimer, Bodenheimer, and red Ingelheimer, grown in the vicinity of Mainz, the Scharlachberger, near Bingen, and the Liebfrauenmilch in the districts around Worms.

Mineral products, which are inconsiderable, include copper, cobalt, iron, salt, and coal, the three latter of which are most abundant in the Wetterau districts.

Industry. — The principal branches of industry are, besides agriculture, the making of wine, which in good years yields a return of more than four million thalers; manufacture of cottons, linens, and stockings, and weaving of straw in Upper Hesse; preparation of oils and leather; and manufacture of paper, snuff, papier-mâché goods, etc. Hesse-Darmstadt is well provided with post-roads, and has a network of railways; while the steam-navigation of the Rhine, Maine, and Neckar, affords still more extensive means of communication, which, however, are partly or wholly closed in winter.

Education.—There are in Hesse-Darmstadt numerous national schools, *real-schulen* (see GYMNASIUM), gymnasia, various theological, technical, industrial, and agricultural schools; while higher educational wants are supplied by the Univ. of Giessen, with its noble library, and numerous scientific institutions connected. The chief towns support scientific and literary societies, and the duchy generally is favorably distinguished for diffusion of knowledge.

Law.—There is a supreme tribunal of law at Darmstadt, with lesser courts at Darmstadt, Giessen, and Mainz, and numerous local courts in country districts, in some of which trial by jury prevails.

Political Constitution, etc.—Hesse-Darmstadt occupied the 9th place in the German Confederation (q.v.), and had 3 votes in the *Plenum* or full council, and 1 vote in the limited council. It is a limited monarchical state. Its ruler, who must be a Lutheran, bears the title of royal highness, and ranks as Grand-Duke of Hesse, and as a Rhenish grand-duke. The succession is hereditary in the female line in default of male issue. In accordance with the law of 1856, modified in 1872, there are 2 legislative chambers of representatives, which must be convoked at least once in every 3 years, but the real power of the government rests with the council of state and the 4 ministries into which the several branches of the administration are divided.

History.—The line of Hesse-Darmstadt, the second main branch of the house, is derived from the Hessian count, George I., who, on the death of his father, Philip the Magnanimous, 1567, obtained the upper countship of

Katzenellenbogen, with the town of Darmstadt for his residence; and succeeded 1583, on the death of his brother without heirs, to a third of the patrimony of the latter. He was succeeded 1596 by his eldest son, Ludwig V., while his third son, Frederick, became the founder of the Hesse-Homburg line (q.v.). Ludwig V., who acquired a portion of Upper Hesse, was founder of the Univ. of Giessen. Although Hesse-Darmstadt, like every other part of Germany, suffered considerably during the French revolutionary wars, it finally acquired great addition to its territories through the agency of Napoleon. Ludwig X., who had succeeded his father as landgraf 1790, joined the Confederation of the Rhine, and after having acted against Austria 1809, and in concert with the French, 1813, offered, after the battle of Leipsic, to act with the allies against France, on condition of being allowed to retain his various acquisitions of territory. He had assumed the title of grand duke 1806, and on that occasion he promulgated various legislative edicts, and annulled the pre-existing union of the Hesse-Darmstadt and the Hesse-Cassel diets. In 1814, he joined the German Confederation, and made large cessions of territory to Prussia, Bavaria, and Hesse-Cassel, receiving by way of indemnification a portion of the French dept. of Donnersberg, or Mainz, extending to the Lahn, and the greater part of the principality of Isenberg, in right of which he assumed the additional title of a Rhenish grand duke. In accordance with the decree of the federal diet, Ludwig gave his subjects a representative form of government in 1820, the scheme of which was, however, so obnoxious to the assembled states, that the grand duke and his advisers were compelled to withdraw it, and to substitute another in its place. The task of framing this constitution occupied several diets in succession, and gave rise to much angry discussion within and without the chambers. The death, 1830, of the grand duke, who from various causes was endeared to his subjects, widened these differences, and angry discussions soon arose in regard to the civil list to be accorded to the new grand duke, Ludwig II. In the course of the next few years, one diet after another was convoked and prorogued, but no material change was effected in the relative position of the chambers and the government. The death of the grand duke, Ludwig II., 1848, and the accession of his son and co-regent, Ludwig III., grand duke until 1877, brought little change for the better. In the meantime, notwithstanding frequent dissensions in church and state, the duchy made considerable advances in material prosperity; railways were opened, and new roads formed; monopolies and other commercial restrictions removed; greater freedom was permitted in the curriculum of the university, and a more liberal spirit infused into the system of the education in the national schools. Although these and many other improvements were grudgingly yielded, they have been permanent, but the character of the grand-ducal policy has neither been liberal nor in accordance with the wishes and views of the majority of the people. See GERMANY.

HESSE-HOMBURG, *hĕs-hŏm'bûrg:* formerly an independent German landgraviate, divided into the provinces of Homburg and Meisenheim; the former bounded by Hesse-Darmstadt and Hesse-Nassau, and the latter by Rhenish Prussia and the Bavarian Palatinate. Since 1866 it forms part of the Prussian provinces of Hesse-Nassau and Rhenish Prussia. See GERMANY.

HESSE-NASSAU. See HESSE-CASSEL; NASSAU.

HESSIAN, a. *hĕsh'an:* relating to Hesse: N. a native or inhabitant of Hesse; also a coarse cloth made of a combination of hemp and jute and used for bagging, known as 'hessian' by the trade.

HESSIAN FLY (*Cecidomyia destructor*): dipterous insect which infests the wheat plant; named from the Hessian soldiers who are supposed to have brought it to this country with a lot of straw in 1776, but some entomologists believe it to be indigenous. It is very common throughout the wheat-growing states. In some seasons it damages the crop to the amount of millions of dollars.

Two broods appear each season; and in the warmer parts of the country a third, but somewhat smaller one, is formed. The adult is a small, dark-colored insect. The larva is an orange-colored maggot without feet. The female lays about 30 eggs, upon the leaves of the wheat plant. The eggs for the first brood are laid in April or May, and those of the second during the first half of September. They hatch in four or five days, and the larvae work their way down between the stalk and a portion of a leaf which envelops it as a sheath. When a joint is reached they fasten themselves to the stalk and feed on its juices. The joint becomes enlarged, the stalk turns yellow, and in many cases is so weakened that it falls to the ground. The affected stalks either fail to fill their heads, or if less severely injured, yield only a small quantity of imperfectly developed grains. In four to seven weeks after commencing their depredations the larvae change to a semi-pupa, or 'flax-seed state.' If this change occurs in autumn they remain without further modification during the winter. The next change is to the pupa form from which they finally emerge as perfect insects.

On account of the secluded position in which it works it is difficult to destroy this pest without, by the same means, destroying also the plants on which it feeds. Various applications have been tried, but it is not easy to place the remedy between the stalk and its sheath, while any substance that would destroy the larve would be likely to kill the plant. Consequently, efforts should be made to prevent the laying of the eggs, and the development of insects from eggs deposited in the autumn. Sowing late in the season is often resorted to as a means of preventing the ravages of the insect, but it proves a serious injury to the crop. A better plan is to sow a strip around the field quite early, leaving the remainder until the usual time of sowing. Most of the eggs will be laid upon the early wheat, which should be plowed into the ground about Sep.

20. This will prevent hatching of the eggs; and the strip, if at once re-seeded, may produce a moderate crop. Pasturing with sheep late in Nov. destroys many larvae. Burning the stubble after harvest also is efficient, and if universally and persistently followed, would eradicate the pest. There are several parasites which destroy large numbers of the larvae. Thorough preparation of the land and high manuring, by increasing the vigor of the plants, enables them to better withstand insect attacks. Spring wheat suffers less than winter grain, and the hardy sorts suffer less than the delicate varieties.

HESSIANS IN THE REVOLUTION, The. In the 18th century Germany was divided into nearly 300 sovereignties, each maintaining a court and a military force. The possible revenue was often very limited, the burdens were almost intolerable, and the princelings were often profligate and cruel; they did not need their forces for home defense, and were glad to make money for themselves by letting out their regiments for hire, though except in one case they remitted no taxes on the people from the receipts. England had not sufficient army for the American War, and wished drilled troops rather than raw recruits, and after vainly endeavoring to hire 20,000 Russian soldiers, turned to the German princes, with some of whom she had dynastic relations, and all of whom were so eager to sell their wares that two of them offered soldiers for hire immediately after Bunker Hill, without waiting to be asked. Only those which could furnish considerable numbers were worth treating with, and all the German auxiliaries were finally hired from six states; about half being from two Hessian states, and by far the largest (more than three times greater than any other) from one. All were indiscriminately termed 'Hessians' as all German immigrants were formerly called 'Palatines.' The first treaty was made with the Duke of Brunswick, 1776, Jan. 9, for 4,300 troops; reinforcements or replacements were sent year by year, till the total had amounted to 5,723, only 2,708 of whom ever returned. The second was with the Landgrave of Hesse-Cassel, 1776, Jan. 15, for 12,805; finally increased to 16,992, of whom 10,492 returned. The contingents from the others, under various treaties, amounted to —Hesse-Hanau, 2,038; Anspach-Baireuth, 2,353; Waldeck, 1.225; Anhalt-Zerbst, 1,152. Total sent to America, 29,867, of whom 17,313 returned; the rest either died or remained as citizens. There were about 20,000 in America at any one time after 1776. These forces cost Great Britain in subsidies and incidentals about £1,770,000; besides the lump sum, it was obliged to replace the dead, and at least in one case count three wounded men as one dead one.

About 18,000 were shipped in 1776; the commander-in-chief was Lieut-Gen. Philipp von Heister, a veteran of the Seven Years' War. The first division of some 8,000 landed at Staten Island, August 15, they included a body of chasseurs and grenadiers under Lieut. E. W. F. von

Donop, an able and daring officer. They took a leading part in the battles of Long Island and White Plains, and all the operations for capturing New York; and stormed Fort Washington with a loss of 56 killed and 276 wounded. During this time the second division of about 4,000, under Lieut-Gen. Wilhelm von Knyphausen, joined them. Washington's surprise at Trenton fell on Col. Rall's brigade of Germans. Rall was a regular officer whose contempt for the ragged Americans surpassed that of the most arrogant Briton, and he refused to take the most elementary precautions; he was mortally wounded. Early in 1777 Heister was superseded by Knyphausen; Howe finding the former intractable, and the Landgrave of Hesse laying the blame of Trenton upon him. Meantime the Brunswickers and a Hanau regiment under Baron von Riedesel had made a clearance of Canada; and in 1777 they were joined to the expedition of Burgoyne in whom Riedesel had no faith. It was from this division that Baum's detachment was sent off to raid Vermont, and to meet its fate at Bennington, with Breymann's sent to support it; 365 of Baum's 374 Germans did not return, and 231 of Breymann's were killed, wounded, or captured. Riedesel and his remaining men shared in Burgoyne's surrender. Around Philadelphia, at Brandywine and Germantown, Knyphausen's command was of the first importance; and at Red Bank, Donop tried to storm the American fort and was mortally wounded, his command losing 82 killed and 229 wounded, besides 60 prisoners. In the three years' occupation of Rhode Island, from the fall of 1776 to that of 1779, about half of the British corps was Hessians. In the South, at Savannah, Charleston, Pensacola, Baton Rouge, etc., they left many dead; and shared in the bloody drawn battle of Guilford Court House. Finally, at Yorktown, they bore the brunt of the actual fighting, losing 53 killed and 131 wounded.

The Germans did their duty bravely and faithfully, with loyalty to a service they had been sold into to no profit of theirs. Very few deserted, in spite of constant inducements held out to them; a policy which Washington strongly deprecated. Probably one reason was, that they were at once recognizable from their speech. Nor were they in the least inhumane or rapacious: the charge that they were cruel barbarians was a mere political weapon of the time. In a strange country, they would have run the risk of being murdered in reprisal had they been such; but in fact they appear to have been well-meaning men. Of the 29,867 who came over, only 17,313 returned to Germany. Of the 12,554 remaining, 548 were killed; some of the total 1,652 wounded died; some disappeared; but a great number are known to have remained and settled in the country. Grants were given them in Nova Scotia, but many scattered as chance directed. See Lowell, *The Hessians in the Revolution* (1884).

HEST, n. *hĕst* [Icel. *heit*, a vow—from *heita*, to promise: O.H.G. *heiz*, a command: see *behest*, of which *hest* is the older form]: in *OE.*, a promise; a behest; a command.

HESTIA, *hĕs'tĭ-a:* Greek goddess to whom was ascribed the art of house-building, believed to be identical with the Vesta of the Romans. She typified home and home life, particularly the domestic hearth; and politically the idea that the state was one great family. It has been argued that if the Greek Hestia and Roman Vesta were identical, the worship of the divinity goes back to a period when the Greeks and Latins were still an undivided people. Each Latin community had its public altar to Vesta, and a central one for the whole people was at Lanuvium, and the sacred fires were renewed annually Mar. 1. The Greeks had a central or common hearth at Athens, and the sacred fire of Hestia there was always kept burning, or if by any mischance it went out, fire made only by friction or obtained direct from the sun's rays was used to rekindle it. Hestia was the altar fire, the goddess of the family union; she shared the honors of all the gods; opening sacrifices were offered her; and the first and last libations at the sacrificial meal were poured to her. Her home was in the Prytaneum, or great hall where the prytanes (certain magistrates who presided over the senate) met to give audiences to the people, offer sacrifices, and feast with special benefactors of their country. The common hearth-fire around which these magistrates sat, was always burning, and there the sacred rites were performed that were believed to sanctify the concord of city life. A statue of Hestia stood in the Prytaneum at Athens, and temples in her honor stood in Hermione and Olympia, but such honors were far less usual to her than to the Roman Vesta.

HESYCHASTS, *hē'sĭ-kăsts* or *hĕs'ĭ-kăsts* [Gr. *hēsychazō*, to be quiet]: mystic and contemplative sect of the Greek Church, who renewed in the 14th c. the errors and practices of the older Euchites (q.v.), and who may be described as the Quietists of the East. There is reason to believe that the principles of the ancient mystics never entirely died out among the oriental monastic bodies; but they attracted unusual attention in both the eastern and the western church in the earlier half of the 14th c. A Basilian monk, named Barlaam, native of Calabria, the ancient Magna Græcia, and himself of Greek origin, in a visit to the monasteries of Greece, observed among the monks several practices and doctrines which he considered grievously reprehensible; and was particularly struck by the doctrinal abuses of the monks of Mount Athos, the 'holy mountain,' the great stronghold of monasticism in Greece. In common with the mystics of all times, these monks placed all perfection in contemplation, and in the elevation and abstraction of soul which contemplation produces. One practice especially provoked his reprobation, and, indeed, his ridicule. Believing that in the soul lay hidden a certain divine light, which it was the office of contemplation to evoke, they withdrew at stated times to a retired place, seated themselves on the earth. and fixed their eyes steadfastly on the centre of the stomach (whence the sobriquet by which they were known, *omphalopsychoi, navel-souls*);

and they averred that, after the allotted time of contemplation, a kind of heavenly light beamed forth upon them from the soul (whose seat, they held, was in that region), and filled them with ectasy and supernatural delight. They declared that this light was the glory of God himself, and they connected it in some unexplained way with the light which appeared at the transfiguration of the Lord Jesus upon Tabor. Barlaam denounced these notions as fanatical and superstitious. On the other hand, they were explained and warmly defended by Gregory Palamas, Abp. of Thessalonica; and to settle the controversy, a council was held in Constantinople 1341, which terminated in the triumph of Palamas and the monks. The controversy afterward turned upon a point of doctrine—namely, on the nature of the so-called divine light supposed to emanate from the soul in this state of contemplation. Other councils were called, one of which, 1351, again pronounced in favor of the monks, through the influence, it is said, of the court and of the celebrated John Cantacuzenus, an ardent patron of the Hesychasts. But the public voice was hostile to the sect, and at the retirement of their patron Cantacuzenus, who, 1355, became a monk, they fell into obscurity. The controversy about the 'Thaboritic Light,' however, is still discussed in Greek theology. Consult Rubenberg's work on *Hesychasts;* Herzog's *Realencyclopädie.* See HYPNOTISM.

HESYCHIUS, *hē-sĭk'ĭ-ŭs:* Greek grammarian of Alexandria, of a period variously assigned between the latter part of the 4th c. and the middle of the 7th: author of a Greek lexicon, taken partly from earlier works of a similar character, with the addition of new words and examples from the writings of poets, orators, historians, and physicians. Its value is very great, as it supplies extensive information concerning the Greek language and literature, especially of an antiquarian kind. The first was published, Venice 1514; the best is by Alberti and Ruhnken (2 vols.- Leyden 1746–66), to which additions were made by Schow (Leip. 1792). Compare Ranke, *De Lexici Hesychiani vera Origine et genuina Forma* (Leip. and Quedlinburg, 1831).—Not to be confounded with the foregoing is the historian HESYCHIUS of Meletus, surnamed the 'Illustrious,' who lived in the beginning of the 6th c., and was author of the following works: (1) On eminent teachers (*Peri tōn en Paideia lampsantōn Sophōn*); (2) On the city of Constantinople (*Peri tōn Patriōn Kōnstantinoupoleōs*); (3) A chronicle or history (*Biblion Historikon,* etc.), from the earliest times, to the death of Anastasius: it is now lost. See Orellius, *Hesychii Opera* (Leip. 1820).

HETAIRISM, n. *hĕ-tïr'ĭzm* [Gr. *hetaira,* a mistress, a courtesan]: the system of communal marriage as practiced by some tribes; indiscriminate concubinage.

HETERARCHY, n. *hĕt'ėr-âr'kĭ* [Gr. *hĕtĕros,* another *archē,* rule]: the government of an alien.

HETERO, *hĕt'ėr-ō,* or HETER, *hĕt'ėr* [Gr. *hĕtĕrŏs,* an-

other]: a common prefix, meaning another; *one* opposite or different; denoting; dissimilarity; irregular; abnormal.

HETEROCEPHALOUS, a. *hĕt'ĕr-ō-sĕf'ă-lŭs* [Gr. *hĕtĕrŏs*, another; *kĕphălē*, the head]: in *bot.*, having some flower-heads male, and other female, on the same plant.

HETEROCERCAL, *hĕt'ĕr-ō-sĕr'kăl* [Gr. *hĕtĕrŏs*, another; *kerkos*, a tail]: term designating a peculiarity of structure in the tail of some fishes, in which the tail is unsymmetrical with reference to the body of the fish or the vertebral column; the vertebral column being prolonged into the upper of the two lobes of the tail, and a second lobe, more or less distinct, appearing on the under side. The heterocercal tail is of great importance to the paleontologist being characteristic of the Cartilaginous Fishes, sharks, rays, and most ganoids. Although apparently strongly contrasted with the equally lobed or homocercal type seen in bony fishes, the study of development shows the latter to be a modification of the former type; compare the tail of a young salmon with that of a shark and a herring.

HETEROCHROMOUS, a. *hĕt'ĕr-ō-krō'mŭs* [Gr. *hĕtĕrŏs*, another; *chrōma*, color]: in *bot.*, having the central florets of a different color from those of the circumference.

HETEROCLITE, n. *hĕt'ĕr-ō-klīt* [Gr. *hĕtĕrŏs*, another; *klitos*, a slope]: anything irregular or anomalous—particularly applied to grammar: ADJ., varying from the common forms; irregular. HET'EROCLIT'IC, a. *-ŏ-klĭt'ĭk*, or HET'EROCLIT'ICAL, a. *-ĭ-kăl*, deviating from the common rule.

HETEROCYSTS, n. plu. *hĕt'ĕr-ō-sĭsts* [Gr. *hĕtĕrŏs*, another; *kustis*, a bag]: in *bot.*, colorless large cells, incapable of division, occuring at intervals in the threads of Nostochineæ.

HETERODOX, a. *hĕt'ĕr-ō-dŏks* [Gr. *hĕtĕrŏs*, another; *doxa*, an opinion]: contrary to right doctrines or tenets; holding doctrines contrary to those established or generally received; heretical; opposed to *orthodox*. HET'ERODOXY- n. *-dŏks-ĭ*, the state of being heterodox; opinions or doc, trines contrary to those generally received; heresy.

HETERODROMOUS, a. *hĕt'ĕr-ŏd'rŏm-ŭs* [Gr. *hĕtĕrŏs*, different; *dromos*, a course]: in *bot.*, running in different directions—applied to the arrangement of leaves in branches in a different manner from the stem; having spirals running in opposite directions.

HETERŒCIUM, n. *hĕt'ĕr-ē'shĭ-ŭm* [Gr. *hĕtĕrŏs*, another; different; *oikos*, a house]: sometimes applied to the potato fungus, so named on the supposition that it exists as a parasite on some other plant before it attacks the potato. HETERŒCISM, n. *hĕt'ĕr-ē-sĭzm*, the state or condition of a parasitic fungus, which is found in one stage of development on one body, and in another stage of development on a different body.

HETEROGAMOUS, a. *hĕt'ĕr-ŏg'ă-mŭs* [Gr. *hĕtĕrŏs*, another; *gamos*, marriage]: in *bot.*, having the essential parts of fructification on different spikelets from the same root;

having male, female, and hermaphrodite flowers. HET'EROG'AMY, n. *-ă-mĭ*, a circuitous method of fertilization in plants, in contradistinction to *orthogamy*, or direct fertilization; the state in which the sexual organs are arranged in some unusual manner.

HETEROGANGLIATE, a. *hĕt'ĕr-ō-găng'glĭ-āt* [Gr. *hĕtĕrŏs*, another, different; *gangglion*, a little tumor under the skin]: in *zool.*, having a nervous system in which the ganglia are scattered and unsymmetrical, as in the mollusca. HETEROGANGLIATA, term introduced by Owen, and adopted by some zoologists, in accordance with a scheme of zoological classification founded on the nervous system in animals, to designate the *Mollusca* of Cuvier, with which are ranked the 'zoophytes' of the division *Polyzoa* or *Bryozoa*. The nervous centres or ganglia are not arranged in a longitudinal series of symmetrical pairs, but are variously distributed in different parts of the body; one principal ganglionic mass, however, occupying a position above the gullet, with which all the nerves of the special senses which exist are connected: with it, also, all the other ganglia communicate.—This new term has not been taken into general use among systematic zoologists, yet it certainly indicates a most important character in the organization of the animals indicated.

HETEROGENEOUS, a. *hĕt'ĕr-ō-jē'nĭ-ŭs*, or HET'EROGE'NEAL, a. *-nĕ-ăl* [Gr. *hĕtĕrŏs*, another; *gĕnŏs*, a kind]: of a different kind or nature; unlike; dissimilar; confused and contradictory, the opposite of *homogeneous*. HET'EROGE'NEOUSNESS, n. HET'EROGE'NEOUSLY, ad. *-lĭ*. HET'EROGENE'ITY, n. *-jĭ-nē'ĭ-tĭ*, opposition of nature; dissimilarity. HETEROGENESIS, n. *hĕt'ĕr-ō-jĕn'ĕ-sĭs* [Gr. *gĕnĕsis*, origin, source]: the doctrine that certain organisms are capable of giving origin to others totally different from themselves, which show no tendency to revert to the parent form sometimes applied to spontaneous generation, in which living cells are supposed to be produced by inorganic matter.

HETEROLOGOUS, a. *hĕt'ĕr-ŏl'ŏ-gŭs* [Gr. *hĕtĕrŏs*, another, different; *logos*, speech, appearance]: in *anat.*, applied to growths which are unlike normal, mature tissues; having a new growth of simple and normal tissue, but occurring in an organ of a different structure and at a distance from tissue of the same kind.

HETEROMEROUS, a. *hĕt'ĕr-ŏm'ĕ-rŭs* [Gr. *hĕtĕrŏs*, another, different; *mĕros*, a part, a portion]: in *bot.*, applied to lichens where the thallus appears stratified by the crowding of the gonidia into one layer, and the hypæ form two layers; in *zool.*, applied to the coleopterous insects which have five joints in the tarsus of the first and second pairs of legs, and only four joints in the tarsus of the third pair. HETEROMERANS, n. plu. *hĕt'ĕr-ŏm'ĕ-rănz*, coleopterous insects whose legs have a different structure from one another.

HETEROMORPHIC, a. *hĕt'ĕr-ō-mŏr'fĭk* [Gr. *hĕtĕrŏs*, another, different; *morphē*, shape, form]: differing in form or shape; in *bot.*, having different forms of flowers as regards stamens and pistils, these being necessary for fertilization, as in *primula*. HETERMORPHISM, n. *hĕt'ĕr-ō-mŏr'-fizm*, a deviation from the natural form or structure. HETEROMORPHOUS, a. *hĕt'ĕr-ō-mŏr'fŭs*, having an irregular or unusual form; having more than one form of flower differing in the relative positions of the essential organs. HETEROMORPHY, n. *hĕt'ĕr-ō-mŏr'fĭ*, deformity in plants.

HETEROPATHIC, a. *hĕt'ĕr-ō-păth'ĭk* [Gr. *hĕtĕrŏs*, another; *pathos*, suffering]: regulating by a different action, force, or law. HET'EROP'ATHY, n. *-ŏp'ă-thĭ*, same as ALLOPATHY.

HETEROPHAGI, n. plu. *hĕt'ĕr-ŏf'ă-jī* [Gr. *hĕtĕrŏs*, another; *phagō*, I eat]: applied to birds that are born in a helpless condition, and require to be fed by the parents for a period.

HETEROPHORIA: a condition in which the visual axes of the two eyes are not parallel.

HETEROPHYLLOUS, a. *hĕt'ĕr-ō-fĭl'lŭs* [Gr. *hĕtĕrŏs*, another; *phullon*, a leaf]: in *bot.*, presenting two different forms of leaves on the same stem. HET'EROPHYLLY, n. *-fĭl'lĭ*, the variation in the leaves of plants in external form.

HETEROPLASTIC, a. *hĕt'ĕr-ō-plăs'tĭk* [Gr. *hĕtĕrŏs*, another; *plastikos*, formed, fashioned—from *plassō*, I form]: in *anat.*, applied to those growths which are unlike the tissues from which they take their rise; heterologous.

HETEROPOD, n. *hĕt'ĕr-ō-pŏd* [Gr. *hĕtĕrŏs*, another; *pous*, or *poda*, a foot]: one of the Heteropoda. HETEROPODA, *hĕt-ĕr-ōp'o-da*, group of branchial gasteropoda, in which the propodium is turned into a laterally compressed fin, while the epipodia are absent—i.e., in which the foot is so modified as to form a swimming organ. The *Heteropoda* are the same as *Nucleobranchiata* of De Blainville; and S. O. Woodward prefers the later name. They are delicate and transparent animals, some only with shells. They swim at the surface of the sea instead of creeping at the bottom; families, *Firolidæ* and *Atlantidæ:* in *paleon.*, the heteropoda came into being not later than the Lower Silurian.

HETEROP'TERA. See HEMIPTERA.

HETERORHIZAL, a. *hĕt'ĕr-ō-rī'zăl* [Gr. *hĕtĕrŏs*, another; *rhiza*, a root]: in *bot.*, applied to rootlets proceeding from various points of a spore during germination; rooting from no fixed point.

HETEROSCIAN, a. *hĕt'ĕr-ŏsh'ĭ-ăn* [Gr. *hĕtĕrŏs*, another *skiă*, a shadow]: applied to the inhabitants of the earth between the tropics and the polar circles, in allusion to their shadows, at noon, always falling in one direction —in the one case toward the north, and in the other

toward the south: N. an inhabitant of either of those parts of the earth.

HETEROSOMATA, *hĕt-ĕr-os-ō′ma-tâ:* group of flat-fishes, sometimes classified as a sub-order of teleost fishes, now generally assigned as a family, *Pleuronectidæ,* of sub-order *Anacanthini,* of order *Teleostei:* see FLAT-FISH: PLEURONECTIDÆ.

HETEROSPOROUS, a. *hĕt′ĕr-ŏs′pŏ-rŭs* [Gr. *hĕtĕrŏs,* another; *spora,* spore, seed]: in *cryptogamic plants,* having both microspores and macrospores on the same individual.

HETEROTAXY, n *hĕt′ĕr-ō-tăks′ĭ* [Gr. *hĕtĕrŏs,* another; *taxis,* arrangement]: in *bot.,* the deviation of organs from their ordinary position or arrangement.

HETEROTROPAL, a. *hĕt′ĕr-ŏt′rō-păl,* or HET′EROT′ROPOUS, a. *-pŭs* [Gr. *hĕtĕrŏs,* another; *tropē,* a turning]: lying across—applied to the embryo of seeds when they lie in an oblique position.

HETMAN, n. *hĕt′măn* [Pol. *hetman;* Russ. *ataman,* a. head man or chieftain]: title of the head or general of the Cossacks, now retained only among the Cossacks of the Don. From earliest times the hetman was elected by the assembled people; the mode of election being by throwing their fur caps at the candidate they preferred, and the one who had the largest number of caps was declared duly elected. The power of the hetman was very great, and extended over life and death. When the Cossacks, 1654, submitted to the Russians, the hetman was permitted to retain his rights as formerly. Empress Catharine entirely abolished the dignity of hetman of the Ukraine, and substituted a government consisting of eight members. The Don Cossacks have, indeed, retained their hetman, but he possesses only the shadow of his former power. The last elective hetman was Count Platoff, prominent in the wars with France (1812–14). After his death, the hetman was appointed by the czar; and ultimately the title was made hereditary in the grand duke, the heir to the throne.

HEUCH′ERA AMERICA′NA. See ALUM ROOT.

HEULANDITE, n. *hū′lăn-dīt* [after *Heuland,* the mineralogist] a mineral, usually of a white, but also of a flesh or tile-red color, occurring in detached crystals, and in layers and granular masses; a silicate of alumina and lime.

HEVELIUS, *hē-vē′lĭ-ŭs,* Ger. *hā-vā′lē-ûs* (or HEVEL, or HEWEL, *hā′vel,* or HEWELKE, *hā-vĕlk′ch,* or HÖVELKE), JOHANN: astronomer: 1611–87; b. Danzig; of an honorable and wealthy family. In 1641 he erected an observatory in his own house, and furnished it with large telescopes constructed by himself. He published numerous astronomical works. Hevelius was the first astronomer (1661) with the exception of Gassendi (1631), to observe a transit of Mercury; and it is now generally conceded that he ranks next to Flamsteed among the astronomers of his day. Delambre gives ten pages to the notice of his labors in his

Historie de l' Astron. Mod., and his life has been written by J. H. Wesphal (Königsb. 1820).

HEW, v. *hū* [Icel. *höggva*, to strike, to cut: AS. *heawan;* Dut. *hauwen;* Ger. *hauen*, to hew]: to cut; to chop; to hack: N. in *OE.*, destruction by cutting down. HEW'ING, imp. HEWED, pt. and pp. *hūd.* HEWN, pp. *hūn.* HEW'ER, n. *-ėr*, one who. HEWED, or HEWN, a. made smooth and even by cutting, as with a chisel; shaped by cutting. To HEW DOWN, to cut down; to fell by cutting. To HEW OUT, to shape; to hollow.

HEWES, *hūz*, JOSEPH: 1730–1779, Nov. 10; b. Kingston, N. J.: signer of the Declaration of Independence. He received a common-school education, engaged in commercial business in Philadelphia, removed to Edenton, N. C., 1763, was elected a state senator the same year, member of the continental congress 1774–77, and the first actual sec. of the navy 1779. He severed his connection with the Soc. of Friends on the denunciation of the congress in which he served by a general convention of the society.

HEW'IT, AUGUSTINE FRANCIS, D.D.: Rom. Cath. priest: b. Fairfield, Conn., 1820, Nov. 27; d. 1897, July 3. Son of Nathaniel H., D.D. (1788–1867), Congl. and Presb. minister. He graduated at Amherst College 1839, entered the Windsor Theol. Institute, Conn., was licensed as a Congl. minister 1842, ordained a Prot. Episc. deacon 1843, received into the Rom. Cath. church 1846, ordained priest 1847, joined the Redemptorist order 1850, and became a leading member of the congregation of St. Paul on its organization 1858. From 1865 he was prof. of philosophy, theol., and Holy Scripture, and later superior, in the Paulist Seminary in New York. He edited the *Catholic World* 1869–74, published numerous works, and received the degree D.D., from Amherst College 1877.

HEWITT, *hū'ĭt*, ABRAM STEVENS, LL.D., statesman: b. Haverstraw, N. Y., 1822, July 31; d. New York, 1903, Jan. 18. He graduated at Columbia College 1842, was acting prof. of mathematics there 1843, admitted to the bar 1845, married a daughter of Peter Cooper 1855, and became associated with him and his son Edward Cooper in extensive iron works. He was sec. of the board of trustees of Cooper Union (p.v.) from its incorporation, an organizer of the 'county democracy' in New York, member of congress (excepting one term) 1874–86, elected mayor of New York 1886, and defeated for that office 1888. In 1867 he reported on iron and steel at the world's fair in Paris, 1876 was chairman of the democratic national committee, and pres. of the American Institute of Mining Engineers. 1883 was orator at the opening of tue East River Bridge, and 1887 received the degree LL.D. from Columbia College.

HEWITT, PETER COOPER, American capitalist and inventor: b. New York 1861. He is the son of Abram S. Hewitt (q.v.), was educated at Stevens Institute, Hoboken, and Columbia College. He entered business with his

father and invented improvements in the processes of the Peter Cooper glue factory, which the Hewitt firm controls. Turning his attention to electricity he invented the Cooper-Hewitt lamp and static converter. The lamp in its present form consists of a glass tube of any desired shape with a bulb at one end which contains a small quantity of mercury. All air is exhausted from the tube, which thereupon fills with vapor from the mercury in the bulb. Electrodes are provided at each end of the lamp, the negative electrode in the bulb of mercury and the positive electrode at the opposite end. On passing a direct current through the lamp the vapor which fills the tube is rendered incandescent and gives off a steady, blue-white light. Owing to the great resistance at the negative electrode to the initial flow of current, it is necessary to use a high voltage to start the lamp. This is commonly done by passing a spark from a 'choking' coil through the negative electrode, which when once penetrated offers but slight resistance to the flow of current. If for any reason the current is interrupted, the high resistance is immediately resumed and must be broken down again before permitting further flow of current.

The light given off by this lamp is entirely lacking in red rays, and consequently does not reveal the real color of the objects it falls upon. It is, however. of great value as a photographic illuminator being rich in actinic rays, which most affect the photographic plate. Mr. Hewitt is investigating with a view to discover means to turn some of the rays of the incandescent vapor into red rays. This discovery will be a means of great economy, because the Cooper-Hewitt lamp is probably the cheapest artificial light in the world. The mercury vapor lamp consumes one half watt per candle-power, as against 3½ watts in the incandescent lamp.

HEWLETT, *hū'lĕt*, Maurice Henry, English author: b. London, 1861, Jan. 22. He was the son of Henry Gay Hewlett, a writer of some little note, and was educated at the London International College, Isleworth. He was admitted to the bar in 1891, and in 1896–1900 was keeper of the land revenue records and enrolments. His reputation was made as an interpreter of the more recondite phases of the life and thought of the middle ages, especially in Italy. His style is a skilful medium for his purpose, but frequently so archaized as to be somewhat difficult. His books are: *Earthwork out of Tuscany* (1895), a collection of Italian studies; *The Masque of Dead Florentines* (1895); *Songs and Meditations* (1897); *Pan and the Young Shepherd* (1898); *The Forest Lovers* (1898), his first popular success; *Little Novels of Italy* (1899); *Richard Yea-and-Nay* (1900); *New Canterbury Tales* (1901); *Fond Adventures* (1904); *The Queen's Quair* (1904); *The Road in Tuscany* (1904); *The Fool Errant* (1905); etc.

HEX, *hĕks* [Gr. *hex*, six]: a common prefix, meaning six. Hexachord, n. *hĕks'ă-kăwrd* [Gr. *hex*, six, and L. *chorda;* Gr. *chorde*, a string or chord]: name given by the ancient Greeks, in their music, to the great sixth. In modern

music, hexachord denotes the six diatonic degrees of which Guido formed his scale, better known by the six syllables, Ut, re, mi, fa, sol, la, to which the scale was sung. The name is given also to a musical instrument of six strings.

HEXAD, n. *hĕks'ăd* [Gr. *hex*, six]: in *chem.*, an element having a combining power of six equivalents; a sex-equivalent element.

HEXADACTYLOUS, a. *hĕks-a-dăk'tĭl-ŭs* [Gr. *hex*, six; *daktulous*, finger, a toe]: having six fingers or toes.

HEXAGON, n. *hĕks'ă-gŏn* [Gr. *hex*, six; *gonĭă*, a corner]: figure of six sides and six angles; when the sides and angles are equal, it is called a *regular hexagon*. The side of a regular hexagon inscribed in a circle is equal to the radius, and by joining the center with the angular points six equilateral triangles will be formed. This property of the hexagon furnishes a very simple method of dividing a circle into six equal parts, and at the same time constructing the hexagon, by merely laying off round the circle lines equal to the radius. Of the three figures which on being repeated can completely fill a plane (the equilateral triangle, square, and hexagon), the hexagon contains the greatest area within a given perimeter, the proportions between the three different figures being nearly as the numbers 4, $5\frac{1}{5}$, 6. Thus bees, making their cells of a hexagonal form, inclose the greatest space with the least expenditure of wax. HEX'AGONAL, *-ăg'ŏ-năl*, having six angles and six sides. HEXAG'ONALLY, ad. *-lĭ*. HEX'AGYN'IAN, a. *-ă-jĭn'ĭ-ăn*, also HEXAG'YNOUS, a. *-ăj'ĭn-ŭs* [Gr. *gunē*, female]: in *bot.*, having six styles or pistils. HEX'AHE'DRAL, a. *-hē'drăl* [Gr. *hĕdră*, a base or seat]: having six equal sides. HEX'AHE'DRON, n. *-drŏn*, one of the five regular solids, according to Plato; but in modern times the term Cube (q.v.) is used in this signification, and hexahedron is taken to include all solid figures of six faces.

HEXAGONENCHYMA, n. *hĕks'ă-gŏn-ĕng'kĭ-mă* [Gr. *hexagōnios*, or *hexagōnos*, six-angled; *engchŭma*, an infusion —from *chuma*, tissue, juice]: cellular tissue which when cut in any direction exhibits a hexagonal form.

HEXAMETER, n. *hĕks-ăm'-ĕtĕr* [Gr. *hex*, six; *metron*, a measure]: the most important form of classical verse; the heroic or epic verse of the Greeks and Romans, the grandest examples of which are the *Iliad* and *Odyssey* of Homer, and the *Æneid* of Virgil. It consists, as its name implies, of six feet or measures, the last of which must be a spondee (a measure composed of two long syllables), and the penultimate a dactyl (one long syllable and two short). If the penultimate is also a spondee, the verse is said to be spondaic. The following are examples of the hexameter:

Pōllă d'ă | nāntă, kă | tāntă, păr | āntă tĕ | dōchmĭă | t'ēlthōn.
HOMER.

Tĭtyrĕ | tū pătŭ | læ, rĕcŭ | bāns sūb | tēgmĭnĕ | fāgī.
VIRGIL.

The hexameter has been frequently employed in modern poetry, especially in German and English. The facility with which the first of these languages forms compounds is favorable to its use; and Klopstock, Goethe, and Voss have produced admirable specimens. It has been doubted whether the English is not too stubborn and intractable for the free-flowing majesty of the hexameter; and the question has had much discussion among scholars; though many think that the *Evangeline* of Longfellow, and to some extent the *Vacation Ramble* of Clough, have shown the practicability of this measure in English. A judgment on this may be formed from the opening lines of *Evangeline:*

'This is the | forest pri | meval. The | murmuring | pines and the | hemlocks
Bearded with | moss, and with | garments | green, indis | tinct in the | twilight.
Stand like | Druids of | eld, with | voices | sad and pro | phetic,
Stand like | harpers | hoar with | beards that | rest on their | bosoms.'

The last two lines show where English versification is weak—viz., in its spondees, unaccented syllables being compelled to do the duty of accented ones. HEXAMETER, a. having six poetic feet. HEX'AMET'RICAL, a. *-mĕt'rĭ-kăl*, also HEX'AMET'RIC a. *-rĭk*, consisting of six poetic feet.

HEXANDRIAN, a. *hĕks-ăn'drĭ-ăn*, or HEXAN'DROUS, a. *-drŭs*, [Gr. *hex*, six; *anēr*, a man; *andros*, of a man]: having six stamens, of the genus HEXAN'DRIA, n. *-drĭ-ă*. HEXAN'GULAR, a. *-ăng'gū-lĕr* [L. *angŭlŭs*, a corner]: having six angles or corners.

HEXAPARTITE, a. *hĕks-a-pârt'īt* [Gr. *hex*, six; L. *partitus*, divided]: in *arch.*, term applied to a vault divided by its arching into six parts.

HEXAPETALOUS, a. *heks'ă-pĕt'ă-lŭs* [Gr. *hex*, six; *pĕtălŏn*, a leaf]: having six petals or flower leaves. HEXAPETALOID, a. *hĕks'ă-pĕt'ăl-oyd* [Gr. *eidos*, resemblance]: in *bot.*, having six colored parts like petals.

HEXAPLA, n *hĕks'ă-plă* [Gr. *hexaplous*, sixfold—from *hex*, six; *aplŏŏs*, single, plain]: collection of the Holy Scriptures in six versions of the Gr. and Heb. text, arranged in columns. HEX'APLAR, a *-plâr*, containing six columns of the same matter in different versions, or in different languages. THE HEXAPLA, celebrated edition of the Septuagint version of the Scriptures, compiled by Origen for the purpose of restoring the purity of its text, and bringing it into closer agreement with the original Hebrew. In the multiplication of transcripts of the Greek text, numerous errors had crept in; and in the frequent controversies which arose between the Jews and the Greek or Hellenist (q.v.) Christians, the latter, in appealing to the Greek text, were often mortified by the discovery that it did not represent faithfully the Hebrew original. To meet this evil, Origen undertook to provide a means of at least verifying the genuine Greek text, as well as of confronting it with the original. With this view he prepared what is known as his *Tetrapla*, or 'fourfold' version, which he afterward extended into the Hexapla. The

Tetrapla contained, in four parallel columns, the Septuagint version, together with those of Aquila, Symmachus, and Theodotion. The Hexapla contained, in addition, the Hebrew text, together with a transcript of that text in Greek characters. In some parts of the Old Testament there were superadded one, two, and even three other versions; so that in some parts the work contains nine columns, whence it is occasionally designated the *Henneapla*, or 'ninefold.' Of the origin of these latter versions little is known.

The Hexapla, however, was something more than a mere compilation of these versions. In the margin were given notes chiefly explanatory, as, for instance, of the Hebrew names. But a still more important characteristic of the work were its restorations and corrections of the original, in which Origen was guided chiefly by the version of Theodotion. This, however, he did, not effect by arbitrary alterations of the received text; but, while he retained the common text, by indicating with the help of certain signs (an asterisk for an addition; an obelisk for a retrenchment) the corrections which he sought to introduce. Both these texts, the common (*koinē ekdosis*) and that of the Hexapla, are found combined in existing MSS. The Hexapla, as a whole, has long been lost; several editions of those fragments of it which it has been possible to recover have been printed; by far the most complete of which is that of the celebrated Benedictine, Montfaucon (2 vols. fol. Paris 1714), which retains, so far as it was preserved in the MSS., the arrangement and even the asterisks of Origen. For more detailed account, see the preface and *Præliminaria* of the work.

HEXAPOD, n. *hĕks'ă-pŏd* [Gr. *hex*, six; *pous*, or *poda*, a foot]: a creature having six legs, as insects. HEXAPODOUS, a. *hĕks-ăp'ō-dŭs*, having six legs.

HEXASTICH, n. *hĕks'ă-stĭk* [Gr. *hex*, six; *stichos*, a verse]. a poem consisting of six verses.

HEXASTYLE, n. *hĕks'ă-sīīl* [Gr. *hex*, six; *stŭlŏs*, a column]: a building with six columns in front, or with six columns to support the roof.

HEXATEUCH, *hĕx'a-tūk* [Gr. *hex*, six; *teuchos*, tool, book]: the first six books of the Bible—Genesis, Exodus, Leviticus, Numbers, Deuteronomy, and Joshua—considered as one specially connected series. See PENTATEUCH.

HEXYL, n. *hĕks'ĭl* [Gr. *hex*, six; *hule*, material of which a thing is made]: a name applied to the class of alcohols containing six atoms of carbon; an aromatic oily liquid.

HEYDAY, int. *hā'dā* [Ger. *heyda*, an exclamation of high spirits: Sw. *hojta*, to shout: Gael. *aite*, glad, joyful]: an exclamation of frolic or exultation: N. frolic; wildness —applied to youth. *Note.*—HEYDAY is often a mere synonym for *high-day*, as in 'heyday of youth.'

HEYDEGUY, n. *hā'dē-gī* [connected with HEYDAY]: in *OE.*, a joyful and frolicsome dance.

HEYDEN, *hī'dĕn*, JAN VAN DER: 1637–1712, Sep. 12; b. Gorkum, Holland: architectural and landscape painter. He was contemporary with Hobbema and Ruysdael, painted in partnership with Adrian van der Velde till 1672, studied mechanics, made valuable improvements in the fire-engine. and became supt. of lighting and director of the firemen's companies at Amsterdam. In his paintings he confined himself to architectural exteriors (with landscape), in which he was remarkably precise and painstaking; but depended on Van der Velde and Lingelbach for figure embellishment.

HEY'DUKE. See HAJDUK.

HEYLIN, *hā'lĭn*, PETER, D.D.: English clergyman, historian, and polemic writer: 1600, Nov. 29—1662, May 8; b. Burford, Oxfordshire; of an ancient Welsh family belonging to Montgomeryshire. He studied at Oxford, where he took the degree D.D. Through the interest of Laud, in whose theory of church and king he devoutly believed, Heylin was appointed chaplain-in-ordinary to King Charles 1629. Subsequently, he held a variety of livings, but was deprived of them during the period of the commonwealth. At the restoration, he was made sub-dean of Westminster, an office which many of his friends thought an utterly inadequate reward of his literary services to the royal cause. Heylin was a very voluminous controversial writer, but his works are of value now only as illustrative of the age in which he lived, and the ecclesiastical party to which he belonged. Among his more than 50 works, are: *History of the Sabbath; Ecclesia Vindicata, or the Church of England Justified; Theologia Veterum; Examen Historicum*, containing, among other things, a violent attack on Fuller's *Church History*, which involved him in controversy with that author; *Historia Quinquarticularis*, or a defense of Arminianism; *History of the Reformation of the Church of England;* and *Ærius Redivivus, or the History of the Presbyterians.*

HEYNE, *hī'neh*, CHRISTIAN GOTTLOB: German critic and archæologist of great celebrity: 1729, Sep. 25—1812, July 14; b. near Chemnitz, Upper Saxony; son of a poor weaver. The pastor of Chemnitz, himself very poor, procured tuition for Heyne at a school in the suburbs, and afterward sent him to Leipsic Univ., but failed to give him money for his support. His sufferings there were frightful, but his endurance was heroic. In 1753, he obtained the situation of under-clerk in the Brühl library at Dresden. In this humble office, he prepared his edition of *Tibullus*, which saw the light 1755, and happening to fall into the hands of Rhunken of Leyden, excited the admiration of that scholar. In 1756, unfortunately for Heyne, the Seven Years' War broke out. Frederick the Great marched against Dresden, and burned, among other things, the Brühl library, but not before Heyne had edited, from a *codex* there, the *Enchiridion* of Epictetus. For some time he led a precarious life, often without employment, and

without bread. In 1761, he married, and supported himself as best he could by writing for booksellers; and 1763, on the death of Gessner, prof. of rhetoric at Göttingen, he was appointed his successor on the recommendation of Rhunken of Leyden (who had not forgotten his editions of *Tibullus* and *Epictetus*). This closed his period of misfortune. The rest of his long life was spent in peace and comfort and professorial activity. The principal works of Heyne, besides those above mentioned, are his editions of Virgil (1767, 6th ed. 1803), Pindar (1774), Apollodorus (1787), Pliny (1790), Conon and Parthenius (1798), and Homer (8 vols. 1802; 2d ed. 1804). He also executed 'almost a cart-load of translations,' besides 'some ten or twelve thick volumes of Prolusions, Eulogies, and Essays,' of which six vols. were published separately under the title of *Opuscula Academica* (Gotting. 1785–1812); and finally, about 7,500 reviews of books in the *Göttinger Gelehrten Anzeigen*, of which he was director from 1770. In addition to this herculean work, he had a private class or *Seminarium* for the advanced study of philology and classical antiquity, from which he sent forth no less than 135 professors. His labors were of large effect in giving the Univ. of Göttingen its high rank among German universities. Compare the Life of Heyne by his son-in-law, Ludwig Heeren (Götting. 1813), and Carlyle's essay on the same.

HEYSE, Paul, *powl hī'zė*, German poet and novelist: b. Berlin, 1830, March 15. He studied classics in his native city, in 1852 traveled in Switzerland and Italy, and two years later he settled in Munich on the invitation of King Maximilian II. of Bavaria, who granted him a pension. He has lived mainly in Munich ever since, devoted almost exclusively to literature. His first work was *Jungbrunnen, Märchen eines fahrenden Schülers* (Tales of a Traveling Scholar) (1850); and to the same year belongs his tragedy *Francesca da Rimini*. *Die Brüder* (1852) and *Urica* (1852) were narrative poems, and formed part of the volume entitled *Hermen* (1854), later *Novellen in Versen*, which did much to establish his reputation. Heyse's genius has found its most perfect expression in his tales or novelettes (Novellen), and in this department of literature he holds almost a unique place among German writers. His work is almost throughout highly finished and artistic, and shows a rich imagination and great fertility in invention. His tales have been published in more than 20 collections, and a selection appeared in 1890 under the title *Auswahl fürs Haüs*. His early successes in narrative verse were followed by such works as: *Die Braut von Cypern* (1856); *Thekla* (1858); *Rafael* (1863); *Syritha* (1867); *Der Salamander* (1879); *Die Madonna im Olwald* (1879); *Liebeszauber* (1889). His best plays are those of his third period, and some of them, especially *Hans Lange* and *Kolberg*, have been acted with great success. *Mary of Magdala* was well received in America. Among them are: *Die Hochzeit auf dem Aventin* (1886);

Gott schütze mich vor meinen Freunden (1888); *Hans Lange* (1866); *Kolberg* (1868); *Die Weisheit Salomos* (1887); *Weltuntergang* (1889); *Die schlimmen Brüder* (1891) *Wahrheit?* (1892); and *Jungfer Justine* (1893). His larger novels *Kinder der Welt* (1873); *Im Paradiese* (1875); *Merlin* (1892); and *Uber allen Gipfeln* (1895), have met with great success. Among other works are: *Skizzenbuch* (1877); *Verse aus Italien* (1880); *Spruchbüchlein* (1885) *Gedichte* (Poems, 5th ed. 1895); and *Neue Gedichte und Jugendlieder* (1897).

HEYWARD, *hā'wērd*, THOMAS, JR.: 1746–1809, Mar. 6; b. St. Luke's Parish, S. C.: signer of the Declaration of Independence. He was son of a wealthy planter, received a private education, studied law in London, became a leader in the early revolutionary party in S. C., was a member of the first committee of safety and of congress 1775–78, was appointed judge of the criminal and civil court of S. C. 1780, the same year commanded a battalion of vols., and was taken prisoner on the surrender of Charleston; and after the war resumed his seat on the bench and was a member of the constitutional convention.

HEYWOOD, *hā'wûd:* large and populous town of Lancashire, England, 8 m. n. of Manchester, on the left bank of the Roach, branch of the Irwell. It is connected with the Rochdale canal by a branch canal; and it is on the Lancashire and Yorkshire railway. Heywood has recently increased with great rapidity in population and wealth, partly in consequence of extensive coal mines in the neighborhood, and partly through manufactures of various kinds. It is an important seat of the cotton manufacture. Fustians, calicoes, nankeens, ticks, and other cotton fabrics are produced. Iron-founding, boiler-making, and the manufacture of power-looms, are extensively carried on. Pop. 25,000.

HEZEKI'AH, *hĕz-ĕ-kī'ah* [Heb. *Hiskiah, Yehiskiyahu*: 'Jehovah strengthens], King of Judah: prob. B.C. 742–688, son and successor of Ahaz, whom he succeeded at the age of 25 (II K. xviii. 2). There is some confusion in the chronology at this point: the usual chronology assigns his reign to B.C. 725–696; but decipherments of the Assyrian inscriptions ,with collation of the scriptural accounts, make probable the period B.C. 717–688. 'There was none like him among all the kings of Judah,' is the praise bestowed upon him II K. xviii. 5; and scarcely less is the praise given, II Chron. xxix. From his accession to the throne, his efforts seem to have been directed chiefly to the abolition of the idolatry which filled the land, and the restoration of the worship of Jehovah to its pristine purity and glory. The temple was reopened, the Priests and Levites whose genealogies had proved correct had their ancient revenues assigned to them, and recommenced the daily service; and the first passover in Hezekiah's reign, was—although a month after the appointed season—celebrated with almost unparalleled pomp for full 14 days, amid a vast

concourse of people, not only of Judah, but even of Israel. Victorious in wars with the Philistines, and relying on an Egyptian alliance, into which he had entered against the warning of the prophet Isaiah, Hezekiah dared also to withhold the annual tribute imposed by Shalmanassar in the days of his father: whereupon, as appears from cuneiform records, Sargon, Shalmanassar's successor, invaded Judea, but without success. When, however, Sargon's successor, Sennacherib, on his way to Egypt and Ethiopia, had already seized Lachish, or, according to Chron. and Isaiah, 'all the fortresses' of Judea, nothing remained for Hezekiah but to ask for peace, and to offer any ransom that Sennacherib might impose. Sennacherib took an enormous sum in silver and gold, for which the sacred treasury and the very doors of the temple were laid under contribution:—perhaps only a stratagem to convince the conqueror of the poverty of the royal coffers. It is doubtful whether Sennacherib, after having received the money given to procure the peace, treacherously marched upon Jerusalem at once, or whether he continued his march to Egypt, and being beaten there before Pelusium, besieged Jerusalem on his return—which would be equal to a second invasion. Hezekiah's efforts to render his capital impregnable were futile. Suddenly, however, 'an Angel of the Lord' (explained by some commentators variously to mean the plague, an earthquake, a sudden attack by King Tirhaka of Egypt, or the Simoom) *slew* during a single night 180,000 men in the Assyrian camp, and Sennacherib was compelled to retreat. Whether Hezekiah's illness—'Shechin,' ulcers, according to some, or the plague, as others understand that word—was before or after Sennacherib's invasion, is not fully established; certain it is, that after his miraculous recovery, indicated to him by the retrograde movements of the dial, he, among other visits of congratulation, received that also of the ambassadors of Merodach Baladon (Mardocampados), King of Babylon. The latter—as appears from the Chaldean historian Berosus—was at that time likewise tributary to Assyria, and sent the embassy with a view to securing Hezekiah's co-operation against the common enemy. Hezekiah imprudently made a great display of his treasures, his magazines, and arsenals; but so far from impressing the messengers with his greatness, he only kindled in Merodach Baladon the desire to possess himself of all these things; and the later Babylonian invasion ending in the captivity of Judah, is undoubtedly to be traced back to this act of vanity on the part of Hezekiah.

The remainder of Hezekiah's life was passed in profound peace and prosperity, so that he was enabled to turn his attention to the internal development of the resources of the country, and the fortification of its towns. He collected great treasures and executed many useful works, among which the aqueducts of Jerusalem were foremost. His was also the golden age of prophetic poetry. Besides Isaiah, there lived in his time the prophets Micah and Nahum.

From a passage in Prov. xxv. 1, it appears that he founded a society of literati, who collected and arranged the ancient documents of Hebrew literature, especially the Proverbs which passed under the name of Solomon. Hezekiah himself was a poet of no low order; witness the hymn that he composed after his recovery. Hezekiah was succeeded by his son Manasseh.

HIATUS, n. *hī-ā'tŭs* [L. *hĭātŭs*, an opening, a cleft—from *hĭō*, I open or gape: F. *hiatus*]: the opening of the mouth in pronouncing words or syllables, when a vowel follows a vowel; the effect so produced; a defect in a MS.; a gap; an opening.

HIBERNACULA, n. *hī'bĕr-năk'ū-lă* [L. *hībernācŭla*, winter quarters]: a name applied to the leaf-buds, as the winter quarters of the young branches; the winter quarters of a wild animal, or of a plant.

HIBERNAL. See under HIBERNATE.

HIBERNATE, v. *hī'bĕr-nāt* [L. *hībernă*, winter quarters, houses for winter]: to pass the winter in a state of seclusion or sleep, as certain wild animals do. HI'BERNATING, imp.: ADJ. having the nature of that which hibernates. HI'BERNATED, pp. HI'BERNA'TION, n. *-nā'shŭn*, the act of spending winter in seclusion or sleep. HIBER'NAL, a. *-năl* [F.—from L. *hībernālĭs*]: of or belonging to winter. *Note.*—The preceding words are sometimes spelled with *y* for *i*.

HIBERNA'TION: peculiar condition of retirement and sleep in which certain animals—chiefly cheiroptera and rodentia—pass the winter. It is not clearly known to what extent hibernation prevails in the animal kingdom. The bats, the hedgehog, the badger, and the dormouse are striking examples of this phenomenon. The term hibernation is not good, because summer heat produces in some animals a condition very similar to that which winter cold produces in others; hence the Germans use the words *Winterschlaf* (winter sleep) and *Sommerschlaf* (summer sleep) to express the two similar if not identical conditions.

The following are the most marked peculiarities presented by bats, hedgehogs, and dormice when in perfect hibernation: The respiration is very nearly suspended, as is shown (1), by the absence of all detectable respiratory acts; (2), by the almost entire absence of change in the air in the bell-jar or case in which the animal is placed during the investigation; (3), by the subsidence of the temperature to that of the atmosphere; and (4), by the capability of supporting, for a great length of time, the entire privation of air. The circulation is reduced to an extreme degree of slowness. In an observation made by Dr. Marshall Hall, the heart of a bat was observed to beat only 28 times in the minute. The excretions are very scanty. The bat is observed to have scarcely any excretion during its continued ethargy. In regard to the nervous system, sensation and volition are quiescent, but reflex or excito-motary actions are readily produced. The slightest touch applied to one of the spines of a hedgehog, or the merest shake given to a bat,

induces one or two inspiratory movements. Dr. Marshall Hall made the important discovery that, while the respiration is almost totally suspended, the muscular irritability is proportionally augmented. All hibernating animals instinctively adopt various measures to secure themselves, during the lethargic period, from disturbance and excitement. They choose sheltered and retired situations, as caves, burrows, etc. Some form themselves nests; others congregate in large numbers. The hedgehog and dormouse roll themselves up into a ball; the bats group together in clusters, with the head downward, and in some species the wings are spread, so that each individual embraces and shelters its neighbor. Revivescence is due partly to the return of warmth, but mainly in all probability to the calls of hunger. The return of the respiration and animal heat to the normal standard is very gradual.

The physiological use of hibernation is doubtless to enable certain animals to avoid the consequences of severe winter cold, and (especially in the case of the insectivorous animals) the deprivation of food. Before the period of hibernation, a large amount of fat is accumulated in the organism; this constitutes the fuel on which the animal lives and supports its low degree of heat during the winter. The other tissues suffer to less extent, and the total loss of weight is sometimes nearly 40 per cent.—a proportion fully as great as that usually sustained in death by starvation. See ANIMAL HEAT; and for a full account of the phenomena of hibernation, see Barkow, *Der Winterschlaf nach seiner Erscheinungen im Thierreich dargestellt* (Berlin 1846).

HIBERNIA, *hī-bēr′nĭ-a*, or IBERNIA, *ī-bēr′nĭ-a*, or IVERNIA, *ī-vēr′nĭ-a*, also IERNE, *ī-ēr′nē:* names by which Ireland is designated in the classical writers. The first mention of Ireland in ancient times occurs in a poem on the Argonautic expedition, attributed to the mythical Orpheus, and perhaps as early as the time of the first Darius. Aristotle speaks of two islands in the ocean beyond the pillars of Hercules, 'called Britannic, very large, Albion and *Ierne*, beyond the Celtæ.' Both Diodorus Siculus and Strabo report the natives to be addicted to cannibalism, but, by the admission of both writers on insufficient grounds. Pomponius Mela, with quite an Irish warmth of eulogy, declares the herbage to be so luxuriant that the cattle who feed on it sometimes burst. Pliny repeats this statement, and adds that the Hibernian mother trains her child from the very first to eat food from the point of a sword. But the most important of all classical authorities on Hibernia is Ptolemy, who describes the country, and gives the names of the principal rivers, promontories, seaports, and inland towns. The island was never conquered, nor even explored, by the Romans. See IRELAND.

HIBERNIAN, a. *hĭ-bĕr′nĭ-ăn* [L. *Hibernĭă*, Ireland]: of or pertaining to Hibernia or Ireland: N. an Irishman. HIBER′NICISM, n. *-nĭ-sĭzm*, a mode of speech peculiar to

the Irish; an Irish idiom. HIBER'NO-CEL'TIC, a. the native Irish language.

HIBISCUS, n. *hĭ-bĭs'kŭs* [L. *hibiscum;* Gr. *hibiskos*, the marsh-mallow]: genus of plants of nat. ord. *Malvaceæ*, type of tribe or sub-order distinguished by a double calyx and fruit of three or more many-seeded carpels united into a many-celled capsule. The species are numerous, natives of warm climates, some of them trees or shrubs, but most of them large herbaceous plants, annual or perennial. The flowers of many are very beautiful. *H. Syriacus*, sometimes called *Althaea frutex*, native of Syria and Carniola, has long been in cultivation as an ornamental shrub, and proves hardy in some more northern lands. Some are favorite hothouse plants. The characteristic mucilaginous and fibrous properties of the *Malvaceæ* are very strongly developed in this tribe. *H. Abelmoschus* (or *Abelmoschus esculentus*) so abounds in mucilage that it is much used in n.w. of India for clarifying sugar. The fruit of H. *esculentus* (or *Abelmoschus esculentus*) is in general use both in the E. and in the W. Indies for thickening soups, and otherwise as food; it is much used also in the southern states. It is called GUMBO, GOMBO, GOBBO, and OCHRA, or OKRO in the W. Indies; BANDIKAI, RAM-TURAI, and DENROOS in different parts of India; and BAMMIA in w. Africa; if indeed the E. Indian *H. longifolius* and the African *H. Bammia* are, as seems probable, mere varieties. It is an annual plant, with a soft, herbaceous stem, 3–5 ft. high, crenate leaves, axillary, sulphur-colored flowers, and pyramidal, somewhat podlike capsules. It is cultivated in some parts of s. Europe. The fruit is used in an unripe state. It is generally much esteemed, but is disliked by some on account of its viscidity. It enters as an important ingredient into the *pepper-pot* of the W. Indies. The ripe seeds are sometimes used in soups as barley. The bark of *H. tiliaceus*—a tree 20 ft. high with a very thick bole—so abounds in mucilage that by chewing it the natives of the South Sea Islands obtain nourishment in times of scarcity. This tree, the BOLA of Bengal—supposed to be the same with the MOHO or MOHAUT of the W. Indies (*A. arboreus*)—is one of the most abundant trees of the South Sea Islands; and the wood being light, tough and durable, is used for many purposes. The bark is very fibrous, and cordage and matting are made of the fibre in various tropical countries. Many other species yield fibres, some coarse, some fine and beautiful, which are used in different countries; but the most important in this respect is *H. cannabinus*, the AMBAREE HEMP and DECKANEE HEMP of w. India, called PALUNGOO at Madras, and MAESTA PAUT in Bengal; a plant generally cultivated in all parts of India, though nowhere in great quantity. It is an annual herbaceous plant; having a straight, unbranching stem 3–7 ft. high. The fibre is not so strong as hemp, and is useful only for ropes and coarse fabrics. It has been suggested that many species of hibiscus might be found valuable for manufacture of paper. *H. Sabdariffa*

is generally cultivated in warm countries, on account of its calyx, which, as the fruit ripens, becomes fleshy, and acquires a pleasant acidity. It is much used for making tarts and jelly, and a decoction of it, sweetened and fermented, affords a refreshing beverage, well known in the W. Indies as *Sorrel Cool Drink*, the plant being called Red Sorrel. *H. Abelmoschus* (or *H. Abelmoschus moschatus*), sometimes called Musk Seed, another plant common in widely separated tropical countries, is cultivated for its seeds, which have a fragrance between that of musk and that of amber. They are much used by perfumers, and are called *Ambrette* or *Graines d'Ambrette*. In Egypt and Arabia they are mixed with coffee; and stimulant and stomachic qualities are ascribed to them. The petals of *H. Rosa-Sinensis* are astringent, and are used by the Chinese to stain their eyebrows and their shoes black.

HICCUP, or Hiccough, n. *hĭk'ŭp* [Dut. *huckup;* Bret. *hik;* F. *hoquet*, hiccup; Dut. *hikken*, to sob: an imitative word: comp. Gael. *iach*, to gasp; *acain*, a sigh: W. *ig*, a hiccup; *igio*, to sob]: sudden short convulsive inspiration attended with a peculiar sound produced in the larynx, and immediately followed by expiration. The movements concerned in the production of hiccups are a spasmodic contraction of the diaphragm, and a certain degree of constriction in the glottis, which occasions the peculiar sound, and limits the amount of air inspired. These convulsive inspirations commonly occur in paroxysms, and succeed each other at intervals of a few seconds. The paroxysm may last only a few minutes, or may extend to hours or days; in the last-named case, it may be dangerous to life, from the exhaustion which it causes, but usually it merely excites a feeling of uneasiness or slight pain about the region of the diaphragm. A debilitated state of the system predisposes to hiccup. In those predisposed to it, any gastric derangement, as emptiness, or over-distension of the stomach, the ingestion of cold water, excessive acidity, etc., will provoke it. Certain diseases are frequently attended by it. When the attack is slight, it may often be stopped by making a very full inspiration, and then holding the breath as long as possible, the diaphragm being thus held in a state of voluntary contraction. Strong pressure, by a belt tightly drawn around the waist will sometimes give relief. In more obstinate cases, aromatic spirit of ammonia, camphor, musk, etc., may be resorted to. A combination of camphor and chloroform (used only under medical advice), and the frequent swallowing of small rounded pieces of ice, are perhaps the most efficient remedies. Hiccup, v. to have the hiccup; to utter a short choking cough. Hicupping, imp. Hicupped, pp. *-kŭpt*. *Note.*—The spelling *hiccough* is due to popular etymology, from the mistaken idea that it was a simple compound of *hic* and *cough*.

HICH'BORN, Philip, American naval officer: b. Charlestown, Mass., 1839. In 1869 he entered the United States navy as assistant constructor, in 1875 was made

constructor, and in 1881 a member of the naval advisory board. From 1893 until his retirement 1901, March 4, he was chief constructor, and as such was identified with the reorganization and enlargement of the new United States navy. He attained rear-admiral's rank, and published a valuable report on foreign dockyards.

HICH'ENS, Robert Smythe, English journalist and novelist: b. Speldhurst, Kent, 1864, Nov. 14. He was educated at Clifton College and the Royal College of Music, and after a short career as a musician turned to journalism. In 1893 he visited Egypt for his health, and there conceived the idea which materialized in the *Imaginative Man* (1895); *The Green Carnation* (1894), however, epigrammatic and keenly satirical in tone, first brought him into public notice. Later works of his are: *After To-Morrow* (1895); *New Love* (1895); *The Folly of Eustace and Other Stories* (1896); *The Londoners* (1897); *Byeways* (1897); *The Prophet of Berkeley Square* (1901); *Felix* (1902); *The Woman with the Fan* (1904); etc.

HICK'EY, Emily, English poet: b. Macine Castle, County Wexford, Ireland, about 1845. She was co-founder in 1881 of the Browning Society with F. J. Furnivall (q.v.) and has lectured on English literature. She has published among other volumes *A Sculptor and Other Poems* (1881); *Verse Tales, Lyrics, and Translations* (1889); *Our Lady of May and Other Poems* (1902); *Havelock, The Dane* (1902); *The Dream of the Holy Rood* (1903); etc. Her verse has been highly praised by critics.

HICKEY PLOT (1776), a conspiracy of the British officials and Loyalists of New York to end the Revolutionary war by the murder or capture of its leaders and the seizure or destruction of its supplies. The heads and probable devisers of it were Governor Tryon, who had fled from the city but remained on a man-of-war in the harbor, and sent supplies of money for bribery, etc.; and Mayor Mathews. The scheme was to kill or seize the patriot generals, and at all events to deliver Washington alive to Sir William Howe, blow up the magazine and secure the passes to the city. Several hundred New York Loyalists were involved. Two of Washington's guard were bought, but a third pretended to accede and revealed the plot. Mathews, a gunsmith named Forbes, and a dozen others were arrested and sent to Connecticut, Mathews carrying the mayoralty flag with him. Thomas Hickey, one of the treacherous guards, was hanged in New York, 1776, June 27, the first military execution in the American army.

HICKES, *hĭks*, George, D.D.: 1642, June 20—1715 Dec. 15; b. Newsham, Yorkshire: learned English nonjuring clergyman and philologist. He studied at Oxford, and 1664 was elected fellow of Lincoln College. In 1665 he passed M.A., and 1666 was admitted into orders. In 1676 he became chaplain to John, Duke of Lauderdale. In 1678 he received the degree D.D. from the Univ. of Glas-

gow, and 1679 from that of Oxford. In 1682 he was appointed one of the king's chaplains, and the following year made dean of Worcester. Refusing at the revolution to take the oaths to King William III., he was deprived of all his benefices: see NON-JURORS. In 1693 he was sent with a list of the nonjuring clergy to the exiled king at St. Germains, and in 1694 was consecrated by a prelate of his own party suffragan bishop of Thetford. His publications in controversial and practical divinity are numerous His greatest work, entitled *Thesaurus Grammatico-Criticus et Archæologicus Linguarum Veterum Septentrionalium*, appeared at Oxford 1705, 3 vols. fol.

HICKOK, *hĭk'ok*, LAURENS PERSEUS, D.D., LL.D.: 1798, Dec. 29—1887, May 7; b. Danbury, Conn.: educator. He graduated at Union College 1820, studied theology, was ordained pastor of the Congl. Church at Kent, Conn., 1824, succeeded Lyman Beecher, D.D., in the Congl. Church at Litchfield, Conn., 1829, became prof. of theol. in Western Reserve College, O., 1836, and in Auburn Theol. Seminary 1844; removed to Schenectady, N. Y., on being elected vice-pres. and prof. of mental and moral philosophy in Union College, 1852; assisted Pres. Nott in the govt. of the college till 1860, then had sole charge till Pres. Nott's death 1866, and was pres. 1866, Mar. 1—1868, July 20, when he resigned and settled in Amherst, Mass. The latter years of his life were passed in philosophical study occasional preaching, writing for religious periodicals, and in other literary work. Besides his contributions to *The Christian Spectator*, *Bibliotheca Sacra*, *Biblical Repository* and *Presbyterian Quarterly*, he published *Rational Psychology, or the Subjective Idea and Objective Laws of all Intelligence* (1848); *System of Moral Science* (1853); *Empirical Psychology, or the Human Mind as given in Consciousness* (1854); *Rational Cosmology ,or the Eternal Principles and the Necessary Laws of the Universe* (1858); *Creator and Creation, or the Knowledge in the Reason of God and His Works* (1872); *Humanity Immortal, or Man Tried, Fallen, and Redeemed* (1872); and *Rational Logic, or True Logic must strike Root in Reason* (1875). He received the degree D.D. from Hamilton College 1843, and LL D. from Amherst College 1866. His thought was strong and profound; and his tendency to develop a philosophical system of his own —though his system has perhaps not been generally apprehended—gives his writings an original charm and great richness of suggestion.

HICKORY, n. *hĭk'ŏr-ĭ* (*Carya*): genus of trees formerly included among Walnuts (*Juglans*), with which they are closely allied, having as their chief difference that in the hickory the husk which covers the shell of the nut separates into four valves; while in the walnut, it is in one piece and bursts irregularly. The hickories are exclusively North American. They are large and beautiful trees, attaining a height of 70 or 80 ft., with pinnate leaves. The timber of all of them is very heavy, strong, elastic, and tenacious, but decays speedily when exposed to heat and moisture,

and is said to be peculiarly liable to injury from worms. Great quantities of hickory are used to make hoops for casks. It is much used for handspikes. Shafts of carriages, handles of whips and golf-clubs, large screws, etc., are made of it. It is greatly esteemed for fuel, burning brightly and giving strong heat. The nuts of some of the species are excellent eating, and much resemble walnuts.—*C. alba*, the SHELL-BARK or SHAG-BARK HICKORY, so called from its shaggy outer bark peeling off in long narrow plates, yields the common *hickory-nut* of the northern states, also known as the *Kisky Thomas Nut*. It abounds in many parts of the country. The trunk is slender. The leaves are often 20 inches long. The nuts are in considerable request, and are sometimes exported. The shell is thin but hard, the kernel sweet. An oil, used by the Indians as food, is obtained from it by pounding and boiling. *C. sulcata*, the THICK SHELL-BARK HICKORY, a very similar tree, abounding in the fertile valleys of the Alleghany Mountains, has a nut with a thick yellowish shell, often brought to market, under the names of Springfield Nut and Gloucester Nut. *C. olivæformis* yields the PACANE, or PECAN NUT, sometimes called the Illinois Nut. Other species yield the MOCKER NUT, PIG NUT, and BITTER NUT.

HICKS, *hĭks*, ELIAS: 1748, Mar. 19—1830, Feb. 27; b. Hempstead, N. Y.: eminent preacher of the Society of Friends. His gifts were early recognized by the society, and at the age of 27 he had become a well-known preacher, and for many years travelled through the States and Canada. His unitarianism, or denial of the doctrine generally held as to the divinity of Christ, with his denial of a vicarious atonement, brought him into disfavor with orthodox Friends; but he preached his own views with perseverance, and at the age of 80 still travelled and preached. The result of his labors was a schism of the society into two divisions, popularly known as Orthodox and Hicksite Quakers, though Hicks himself never accepted the last as a proper designation. He was an early and uncompromising opponent of slavery. He died at Jericho, N. Y. See Elias Hick's *Journal of his Life and Labors* (Philadelphia 1828); also a vol. of Sermons, Observations on Slavery, and a *Doctrinal Epistle*.

HICKS, THOMAS: 1823, Oct. 18—1890, Oct. 8; b. Newtown, Penn.: artist. He received an academical education; studied painting in the Penn. Acad. of Fine Arts, and (1838) in the National Acad. of Design; made his first exhibition—*The Death of Abel*—in the National Acad. 's exhibition 1841; studied in London, Paris, Florence, and Rome 1845–49; and opened a studio for portrait-painting in New York 1849. While abroad he painted his half-length figure *Italia*. He was elected a member of the National Acad. of Design 1851, was pres. of the Artists' Fund Soc. of New York 1873–85, and has painted portraits of many eminent Americans, a group of American authors, and one of the governors of N. Y.

HICKS, Thomas Holliday: 1798, Sep. 2—1865, Feb. 13; b. Dorchester co., Md.: statesman. He was brought up on a farm, received a dist. school education, engaged in mercantile pursuits 1831, was elected to the legislature 1836, register of wills 1838, member of constitutional convention 1849, gov. of Md. 1858–62, appointed U. S. senator as a republican to fill vacancy, elected for full term, and served from 1863 till death. He was a strong Union man during the civil war, and refused to call a convention to consider the projected secession of his state even when officially requested to do so.

HICKS-BEACH, Sir Michael Edward: statesman; b. London, 1837, Oct. 23. He was educated at Eton and Christ Church, Oxford, graduated B.A. 1858, promoted first class in law and modern history, and graduated M.A. 1861; was elected member of parliament 1864; was parliamentary sec. to the poor-law board 1868, and part of the time under-sec. for the home dept.; became chief sec. for Ireland as a conservative 1874; was admitted to the cabinet 1877; sec. of state for the colonies 1878, Feb.—1880, Apr.; chancellor of the exchequer and leader of the commons under Lord Salisbury 1885, June—Nov.; re-elected member of parliament 1886; succeeded John Morley as chief sec. for Ireland; pres. of the board of trade 1888–92; and chancellor of the exchequer 1895–1902.

HICKS-PASHA, *hĭks-pâ-shâ′* (Col. William Hicks): b. England; died 1883, Nov. 4: soldier. He entered the Indian (British) army 1849, served through the Sepoy rebellion, took part in the campaign for the subjugation of Oude and the subsequent actions with Nana Sahib, was brigade-maj. and received a medal and the brevet of maj. for services at the capture of Magdala, Abyssinia, 1868, and became an hon.col. and was appointed to the reserve 1880. He went to Egypt with the British expedition, became chief of staff in the reorganized Egyptian army, and commander-in-chief of the Soudan army, led an expedition of more than 10,000 men against El Mahdi, 1883, Sep.; and was killed with a large part of his army near El-Obeid at the close of a three days' battle .

HICRA-PICRA. See Hiera-picra.

HIDALGO, n. *hĭ-dăl′gō* [Port. *Fidalgo;* Sp. *hijo*—from L. *filĭŭm*, a son, and *algo*—from *alĭquod*, something i.e. 'son of somebody']: in *Spain*, a nobleman of the lowest class.

HIDDENITE, *hĭd′en-īt:* emerald-green crystal from ½ in. to 3 in. long; discovered by I. A. D. Chamberlain in Alexander co., N. C., 1876, and named after Prof. W. E. Hidden, who announced its discovery and described it 1879. It has since been adopted by jewelers as a gem of the first order, and as it commands the same price per carat as the diamond, it is entitled to be considered the only precious stone found in the United States exclusively.

HIDE, v. *hīd* [Dut. *hoeden*, to keep, to protect: W. *huddo*, to cover: Norw. *hide*, the lair of a beast]: to be

withdrawn from sight; to conceal; to keep secret. HI'DING, imp.: N. concealment. HID, pt. *hĭd*, did hide. HIDDEN, pp. *hĭd'n*, concealed: ADJ. that cannot be seen or known; secret; mysterious. HID'DENLY, ad. *-lĭ*. HIDE-AND-SEEK, a child's amusement, in which some hide and others seek them. HIDING-PLACE, a place of concealment.—SYN. of 'hide': to cover; secrete; screen; shelter; disguise; dissemble; withhold, defend.

HIDE, n. *hīd* [AS. *hyd;* Ger *haut;* Dut. *huyd;* Icel. *hud*, skin of a beast; *hyda*, to skin a beast, to give a flogging to]: the skin of a horse, ox, or other large animal (see LEATHER): V. to give a flogging to. HIDING, n. *hī'dĭng*, in *familiar language*, a beating. HIDE'BOUND, a. applied to a disease of cows and horses characterized by a morbid tightness of the skin; having the bark so close and firm as to impede growth—said of trees; hard; niggardly.

HIDE, n. *hīd* [AS. *higid*, an estate sufficient for one family]: an anc. measure of land of about 100 acres, or as much as could be tilled by a single plow. HIDAGE, tax formerly paid to the kings of England for every hide of land: the word sometimes meant exemption from that tax.

HIDEOUS, a. *hĭd'ĭ-ŭs* [F. *hideux*, hideous: OF. *hisdeux*, and *hidour*, dread—from mid. L. *hispĭdōsŭs*, roughish; Sw. *hisna;* Low. Ger. *huddern*, to shudder]: horrible; frightful to the sight; exciting terror; in *OE.*, detestable. HID'EOUSLY, ad. *-lĭ*, in a manner that shocks; dreadfully. HID'EOUSNESS, n.—SYN. of 'hideous': horrid; dreadful; shocking; frightful; ghastly; grim; grisly; terrible.

HIE, v. *hī* [AS. *higan*, to endeavor: Dut. *hiighen*, to pant: comp. Gael. *thig*, to come]: to come or go; to hasten; to go in haste. HIEING, imp. *hī'ĭng*. HIED, pp. *hīd*.

HIEMAL, a. *hī-ē'măl*. See HYEMAL.

HIERACIANS, n. *hī-ĕr-ā'sĭ-anz*, or HIERACITES, n. *hī'-ĕr-a-sīts:* in *eccles.* and *chh. hist.*, followers of Hierax, Bp. of Leontopolis, a book-copier, who flourished toward the close of the 3d c. He believed that Jesus promulgated a law much more strict than that of Moses; therefore those Christians who aspired after the highest attainments, were enjoined to abstain from flesh, wine, marriage, etc. He allegorized Scripture, denied the resurrection of the body, and excluded those who died in infancy from the kingdom of heaven.

HIERA'CIUM. See HAWKWEED.

HIERA-PICRA, n. *hī'ĕr-ă-pĭk'ră* [Gr. *hĭĕrŏs*, sacred; *pĭkrŏs*, bitter]: a popular remedy in domestic practice for constipation, known by the name *hickory pickory*, or *hicra picra*, sometimes *Holy Bitter;* composed of four parts of powdered aloes and one part of canella; identical with the officinal preparation *Pulvis Aloës cum Canellâ*. The principal objection to its use as a purgative is, that the nauseous taste of the alœs is not concealed by the canella, and that, like aloetic preparations generally, it is liable to cause irritation of the lower part of the intestinal canal.

HIERARCH, n. *hī'ĕr-ârk* [Gr. *hĭĕrŏs*, sacred; *archos*, a ruler or prince]: the chief of a sacred order. HI'ERAR'CHAL, a. *-âr'kăl*, pertaining to hierarchy or sacred government; also HI'ERAR'CHICAL, a. *-kĭ-kăl*. HI'ERAR'CHICALLY, ad. *-lĭ*. HI'ERARCHY, n. *-âr-kĭ*, ranks or orders of the sacred ministry, commonly applied to the order of churches governed by prelates (see HIERARCHY); the priesthood. HI'ERAT'IC, a. *-ăt'ĭk*, pertaining to priests or to sacred uses. HIERATIC WRITING: see HIEROGLYPHICS. HI'ERARCHISM, n. *-âr-kĭsm*, church government by a hierarchy. HI'EROC'RASY, n. *-ŏk'ră-sĭ* [Gr. *krătĕō*, I am strong or powerful]: government by priests; hierarchy.

HI'ERARCHY: the whole sacred governing and ministering body of the church, distributed according to its several gradations. The word, in strict acceptation, is applicable only to the Rom. Cath. Church, and to those bodies which are under the prelatical form of church government, or which at least maintain the distinctions of ecclesiastical order and gradation. In considering the hierarchy of the Rom. Cath. Church, it is necessary to bear in mind the well-known distinction of *order* and of *jurisdiction*. I. Considered under the head of *order*, the hierarchy embraces all the various orders or classes of sacred ministers to whom has been assigned the duty of directing public worship, administering the sacraments, and discharging the various other offices connected with the oversight of the general church or of its local congregations; and these are of two kinds—the orders directly instituted by divine authority, and those established by ecclesiastical ordinance. Theologians maintaining a hierarchy commonly distinguish a *hierarchy of divine right* and a *hierarchy of ecclesiastical right*. (1.) The first includes the three ranks of bishops, priests, and deacons. The bishops are believed, as successors of the apostles, to have inherited the integrity of the Christian priesthood. The order of episcopate, however, is not believed to be a distinct order from that of priesthood, but rather a fuller and entirely unrestricted form of that order. In all that regards what Rom. Catholics believe to be the Christian sacrifice of the eucharist, they hold that the priest possesses the same power *of order* with the bishop; but he cannot confer the sacrament of orders, nor can he validly exercise the power of absolving in the sacrament of penance without the approbation of the bishop. The office of deacons is, to serve as helpers of the priests and bishops, especially in the administration of the eucharist and baptism, and in the relief of the material as well as the spiritual necessities of the faithful (Acts. vi. 1, and foll.). (2.) To the three ranks held to have been thus primitively instituted, several others have been added by ecclesiastical ordinance: (see ORDERS, MINOR). II. The *hierarchy of jurisdiction* directly regards, and is founded on, the government of the church, and it comprises not only all the successive degrees of ecclesiastical authority derived from the greater or less local extension of the several spheres within which such governing authority is limited—beginning with the pope as

primate of the universal church, and extending to the patriarchs as ruling their several patriarchates, the primate in the several kingdoms as national churches, and the metropolitans or archbishops within their respective provinces;—but also, though less properly, the ecclesiastical grades which, although ecclesiastical jurisdiction may be attached to them, are more directly honorary in their nature, as those of the cardinalate, the archipresbyterate, and the archidiaconate.

In the Anglican Church and its derived churches, the theory of a hierarchial gradation of rank and of authority has been retained with the office of the episcopate. The Anglican Hierarchy comprises bishops, priests and deacons. In the Scottish Church (Presb.) it is of course unknown, as it is in the greater number of the foreign Prot. churches; while those Lutheran communities which have retained or have revived the title of bishop, concede little to the office which can be considered as imparting a strictly hierarchical character to the distinction of grades in the ministry which it imports. The Lutheran bishop has little beyond his brother-ministers, except the right to bear certain insignia, and the first place in the consistories.

In the well-known work, *The Celestial Hierarchy*, falsely ascribed to Dionysius the Areopagite, the hierarchy includes Christ as its head, and the various orders of Angels as his ministering spirits. (See APOSTLE; ARCHBISHOP; BISHOP; CARDINAL; CHURCH; CLERGY; DIOCESE; EPISCOPACY; EXARCH; PATRIARCH; POPE).

HIERO, *hī'ė-rō*, I., Tyrant (i.e. King) of Syracuse: succeeded his brother Gelon B.C. 478; d. B.C. 467, at Catana (reigned B.C. 478–467). The most important event of his reign was the naval victory of his fleet and that of the Cumani over the Etruscans 474, which deprived the latter of their supremacy in the Tyrrhenian Sea. In 472, Thrasidæus, who had become tyrant of Agrigentum, was conquered by Hiero. Hiero himself was violent and rapacious, of worse character than his brother Gelon. His love of poetry, and the manner in which he entertained poets like Simonides, Æschylus, Bacchylides, and Pindar at his court, have perhaps caused him to be overestimated.

HIERO II., Tyrant (i.e. King) of Syracuse: b. previous to B.C. 306; d. B.C. 216 (reigned B.C. 270–216): son of a noble Syracusan named Hierocles. During the troubles in Sicily after the retreat of King Pyrrhus, B.C. 275, Hiero greatly distinguished himself, and was first appointed commander-in-chief, and then elected king. He joined the Carthaginians in besieging Messana, which had surrendered to the Romans. But he was beaten by Appius Claudius the Roman consul, and obliged to retire to Syracuse, where he was soon blockaded. In 263, threatened by a large army under Manius Valerius Maximus, he concluded a peace with the Romans for 15 years, during which he proved so faithful to his engagements, that in 248 peace was permanently established. Hiero himself visited Rome 237, on which occasion he presented the Roman people with 200,-

000 bushels of corn. In the second Punic war he likewise proved himself the faithful ally of the Romans, and supported them with money and troops, especially after defeat at the lake of Thrasymene, when the golden statues of the goddess of Victory, weighing 320 pounds, which he sent to Rome, were welcomed as a good omen. His son Gelon having died before him, he was succeeded by his grandson Hieronymus. Hiero, by his clemency, wisdom, and simplicity, had gained the affections of the Syracusans, who refused on several occasions to accept his resignation of the kingly office. He gave great attention to the improvement of agriculture, and his laws respecting the tithe of corn, etc. (*Leges Hieronicæ*), were still in force in the country in Cicero's time. He was a patron of the arts.

HIEROCLES, *hī-ĕr'o-klēz:* Neo-Platonic writer of the middle of the 5th c.; b. prob. in Alexandria; d. prob. abt. 490. He had very great reputation. He is usually reckoned author of a commentary on the golden verses of Pythagoras, of which the best ed. is by Warren (Lond. 1742). Of Hierocles's history we know nothing. His most celebrated works are—*On Providence, Fate, and the Harmony between the Divine Government and Man's Freewill;* of which there remain only a few extracts preserved by Photius, published by Morelli (Paris 1593 and 97). He maintained a general but not a particular providence, and the entire freedom of the individual will as against Divine fore knowledge; the only thing that is fore-ordained being the connection between volitions and their natural consequences. Another ethical work by Hierocles, *On Justice, Reverence of the Gods, and the Domestic and Social Virtues,* is known to us from a number of extracts in Stobæus. There is also a work called *Asteia* ('a collection of jests and ludicrous stories') attributed to him, but it is now believed to belong to a much later age.

HIEROGLYPH, n. *hī'er-ŏ-glĭf,* or HI'EROGLYPH'IC, n. *-ĭk* [Gr. *hĭĕrŏs,* sacred; *gluphō,* I carve]: a sacred character or symbol; the sculpture or picture-writing of anc. Egypt —usually in the plu. HIEROGLYPHICS (q.v. below). HI'EROGLYPH'IC, a. *-ĭk,* or HI'EROGLYPH'ICAL, a. *-ĭ-kăl,* expressive of some meaning by pictures or figures; emblematic. HI'EROGLYPH'ICALLY, ad. *-lĭ.* HI'EROGLYPH'IST, n. one skilled in the reading of hieroglyphs. HIEROGRAM, n. *hīĕ'r-ŏ-grăm* [Gr. *gramma,* a letter]: a species of sacred writing. HI'EROGRAMMAT'IC, a. *-măt'ĭk,* pertaining to a hierogram. HI'EROGRAM'MATIST, n. a sacred writer. HI'EROG'RAPHY, n. *-ŏg'ră-fĭ* [Gr. *graphō,* I write]· sacred writing. HI'EROGRAPH'IC, a. *-ĭk,* or HI'EROGRAPH'ICAL, a. *-ĭ-kăl,* pertaining to. HI'EROL'OGY, n. *-ŏl'ŏ-jĭ* [Gr. *logos,* a word]: the science of hieroglyphics. HI'EROLOG'IC, a. *-lŏj'ĭk,* or HI'EROLOG'ICAL, a. *-ĭ-kăl,* pertaining to. HI'EROL'OGIST, n. *-jĭst,* one who is skilled in . HI'EROMANCY, n. *-măn-sĭ* [Gr. *manteia,* divination]: divination by observing the things offered in sacrifice. HI'EROPHANT, n. *-fănt* [Gr. *phainō,* I show, I explain]: in *anc. Greece,* a priest who initiated candidates into sacred mysteries and duties. HI'EROPHAN'TIC, a. *-tĭk,* pertaining to.

HIEROGLYPHICS: representations of natural or artificial objects used to express some meaning, especially those pictures or figures which the ancient Egyptians and Mexicans employed for that purpose—a sort of language. The term *hieroglyph* would, however, be more correctly applied to these figures. The number of those used by the ancient Egyptians was probably about 1,000, by which all the ideas requisite were expressed with correctness, clearness, and facility. The H. consist of representations of celestial bodies, the human form and its parts in various attitudes, animals, fishes, reptiles, works of art and attire, and fantastic forms. These were either engraved in relief, or sunk below the surface, on the public monuments and objects of hard materials suited for the glyptic art, or else traced in outline with a reed pen on papyri, wood, slices of stone, and other objects. The scribe, indeed, wrote from a palette or canon called *pes*, with pens, *kash*, from two little ink-holes in the palette, containing a black ink of animal charcoal, and a red mineral ink. The hieroglyphs on the monuments are sometimes sculptured and plain; at others, decorated with colors, either one simple tone for all the hieroglyphs, which are then called monochrome; or else ornamented with a variety of colors, and then called polychrome; and those painted on coffins and other objects are often first traced out, and then colored in detail. On the papyri and some few inferior materials, they are simply sketched in outline, and are called linear hieroglyphs. The hieroglyphs are arranged in perpendicular columns, separated by lines, or in horizontal, or distributed in a sporadic manner in the area of the picture to which they refer. Sometimes all these modes of arrangement are found together. One peculiarity is at once discernible, that all the animals and representations face in the same direction when they are combined into a text; and when mixed with reliefs and scenes, they usually face in the direction of the figures to which they are attached. When thus arranged, the reliefs and hieroglyphs resemble a MS., every letter of which should also be an illumination, and they produce a gay and agreeable impression on the spectator. They are written very square, the spaces are neatly and carefully packed, so as to leave no naked appearance of background. Generally, they are to be read from the direction in which they face, and the lines follow in the same suceession, but many exceptions occur, in which they follow the reverse order, whether written horizontally or vertically, and this at all periods.

The hieroglyphs, in their nature, are divided into two great classes—*Ideographs*, or those which represent ideas; and *Phonetics*, or those which express sounds. No doubt, at the commencement of the language, ideographs only were employed; but the earliest known monuments, which date from the 3d dynasty more than 2,000 years B.C., are filled with phonetic hieroglyphr, showing that at that early period the principle of writing sounds had been completely developed. These hieroglyphs, at the most developed period of the language, comprised about one third of the texts. The ideographs are divided into two classes—the

simple ideographs, or those which express one idea; and the determinatives, used to indicate many. In both classes these ideographs are occasionally found preceded by phonetic groups, which give the sound of the idea that they are intended to express in the written language; the simple ideographs being found preceded by only one group; while the determinatives are preceded by many. The pure ideographs are of various classes: first, those representing the object directly, as , a dog, *uhar*, to express the idea dog; secondly those metaphorically conveying the required meaning, as , a woman beating a tambourine to indicate 'joy,' in which the action indicates the effect produced; thirdly, that in which the attribute is expressed by the figure of some object possessing it, as , a jackal, to indicate 'cunning' or 'craft;' a flaming censer, to signify 'incense.' Or the direct action was often represented; as a bird fishing , to express the idea of fishing in general. Such a mode of depicting ideas in detail was suited only for elaborate monuments; and the number of ideographs required to express all ideas, would have been so many as to have overwhelmed the memory of the learner, and to have obscured the comprehension of the reader; therefore, to reduce the number of *ideographs*, a certain number of these hieroglyphs were used to express more ideas than one in the principal classes of thought. Thus, , a seated man, originally employed to signify man, was applied to all relationships, functions, and offices of men, as *atf*, father; *sen*, brother; *mer*, governor; *hentneter*, priest; *bak*, laborer: the special meaning which it conveyed being shown by the phonetic groups which preceded it. In the same way, all beasts or objects made of leather were expressed by a skin ; all precious stones or objects made of the same by a ring, O; all actions of locomotion by , two legs in the act of walking; and all actions in which the arms were used by , an arm holding a stick. The number of these signs may be computed at 175, and they resemble in their use those of the Assyrian cuneiform, in which, though to a less extent, the leading classes of thought were determined by a character prefixed to the phonetic group giving the particular idea. Thus, in the Assyrian, all names of men are preceded by , a single upright wedge; all countries by , three wedges disposed obliquely; and names of horned cattle by the group of five wedges . In the Egyptian system, however, the determinatives are always placed after the phonetic groups, and are more numerous. The Chinese system of writing approaches still more closely to the Egyptian, 242 radicals, as they are called, but really determinatives, being placed after other groups and symbols, which indicate the special idea intended. In the Chinese language, the radicals are generally placed to the left, as , *haou*, 'good,' in which the radical is , *neu*, 'a

woman,' except in those instances in which they inclose the phonetic or special groups. In the Egyptian hieroglyphs, every word not expressing an abstract idea, as the verb to be, or the grammatical forms, and pronouns, is accompanied by its determinative, and is incomplete without it. The genius of the writing is that the phonetics and ideographs mutually explain each other. Sometimes, indeed, by a kind of redundant pleonasm, the determinatives are placed after the special ideographs, as , the three rings, of metal after the cape used to express gold and silver; , the three flowers after the lily, to signify lily; and , the skin after the goat, to mean goat. The phonetic portion of the hieroglyphs consists, at the best period of writing, of a limited number of signs, about 130, employed as a syllabarium; and though the term alphabet has been often used in speaking of the phonetic hieroglyphs, nothing of the nature of a pure alphabet existed till a later period, when the Phœnicians invented a purely alphabetic system, suppressing the vowels, which the Greeks still further improved by reintroducing them into their graphic system, and so brought to perfection the invaluable invention of alphabetic writing, at once concise, compendious, and complete. But the Egyptian hieroglyphs comprise two classes of syllables—those ending with vowels, or the so-called alphabetics, and those ending with consonants; or, in other words, of monosyllables and polysyllables. As the monosyllables enter into the composition of the polysyllabic groups, it is evident that they are older than the biliteral or dissyllabic hieroglyphs. The spoken language seems, in fact, to have originally consisted of monosyllables, which

an eagle, A*a*.

an arm, A*a*.

a reed, Âu.

a calf, Au.

a heron, Ba.

a leg, Bu.

a cerastes, Fi.

an eaglet, Ga.

a vase, Ga.

a viper, Gi.

leg of a stool, Ha.

a house, Ha.

a papyrus plant, Ha.

fore-part of lion, Hâ.

twisted cord, Hi.

a tusk, Hu.

a club, Hu.

two reeds, Iu.

two oblique strokes, Iu.

a bowl, Kâ.

leaf of water-lily, KHa.

a mormorus fish, KHa.

a mace, KH*a*.

a sieve, KHi.

a garment, KHu, or Au.

a lion, Ru, or Lu.

a mouth, Lu, or Ru.

a pen, Ma.

a weight, Ma.

a hole, Mâ.

an owl, Mu.

a vulture, Mu.

a water-line, Na.

a red crown, Na.

a vase, Nu.

a goose flying, Pa.

a shutter, Pu.

a knee, Qa.

a stand, Qa.

top of quiver, Sa.

a goose, Sa.

a woof, Sa.

a reed, Su.

a bolt, Su.

back of chair, S(en or -et).

a garden, SHa.

part of dress, SHa.

a pool, SHi.

a spindle, Ta.

a hand, Ti.

twisted cord, Ti.

a muller, Tu.

a duckling, Ui.

a twisted cord, Ui.

were subsequently enriched by agglomeration, and combined into biliteral and triliteral roots. Several of these monosyllabic words have descended from the ancient language to the Coptic, as *ab*, a lamb; *au*, a cow; *mau*, a lion; *ra*, the sun; *pe*, the heaven. Numerous words of this class may still be traced as the roots of the more ancient language, but it is obvious that only a few of the most unmanageable could be selected for the combined purpose of sound and writing. In some instances, two or more seem to have been selected for the same sounds, in order to suit the style of writing, horizontal or vertical signs being required for the careful packing of the groups in the texts. Now, it will be necessary to bear in mind that each of these hieroglyphs of the first phonetic division represents a monosyllable, of which it represents the whole by itself considered as the initial, but that it was always capable of having the vowel hieroglyph which followed the initial placed after it, and that in the hieratic or cursive Egyptian writing, this was generally the case, in order to distinguish the signs. This final vowel is, however, generally omitted in hieroglyphic texts, and is said to be *inherent*, or that it ought to be pronounced in the first hieroglyph. The alphabetic syllabarium is as above.

HIEROGLYPHICS.

This comprises all the signs which may be considered alphabetic in their nature, at the best period, or from the 4th to the 21st dynasty, when a revolution took place in the mode of writing, and about 90 additional signs, taken from the ideographs and syllabics, were added to the preceding alphabetic, and used indiscriminately—not, indeed, all at once, but by gradual introductions, from the 21st dynasty till the 2d c. after Christ. Nor are all the signs of the preceding alphabet of equal antiquity, or as much used as others. As to the inherent nature of the vowels, it may be observed that A, the commonest, is often written with its complement *u* after it, as Au, and that is indifferently expressed with , as Ha. Of the three forms of the A, the first expresses the aspirate, the second the nasal, the third the soft breathing. Besides, too, their final complement, the initial sound, especially of consonants, probably of those newly introduced into the system, was placed before them, to explain their use Thus was ofen written Nu, preceded by *N*, and followed by *u*, and others in the like manner. The consideration of the signs that precede and follow, indeed determines the sonal value of certain hieroglyphics which are thus encased and explained by other phonetics.

The syllabics are constructed on the same plan. They consist of an initial hieroglyph, which is capable of expressing by itself the whole syllable, as Am, Her, but which take after them there inherent consonant or complement, as AM, HER, and are sometimes preceded by their initial compiement, as

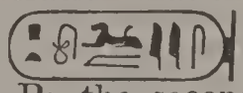
These are more numerous than the alphabetico-syllabic class, and are as commonly used in the texts. The language had impressed upon it by this mode of writing a certain ideographic character, which it retained, certain words being written only by certain syllabics, and the use of the two syllabaries was by no means promiscuous, the examples of different modes of grouping the same word being abnormal, and referable to long intervals of time For though several hundred papyri exists in the museums of Europe, and no two are written precisely alike, yet the greatest differences will be observable in those which are similar texts, written at long intervals of time from each other. Nevertheless, some latitude prevails in the writing of certain words and proper names, and those hieroglyphs which appear in the corresponding places of others are called *variants* or *homophones*. Sometimes the same proper name is represented by six different groups of hieroglyphs, yet they could have been pronounced in only one way, as they represent the same name, and the different hieroglyphs are consequently only interchanged to express the same sounds.

The *language* of the hieroglyphs is nearest to the Coptic. the form which it assumed about the 3d c. after Christ, when the Greek alphabet, reinforced by letters borrowed from the demotic or popular cursive hand of the period, superseded the demotic and hieroglyphic mode. The Coptic (q.v.), extinct only as spoken about a century and a half ago, differs considerably from the monumental texts, having been corrupted by the introduction of Greek, Latin, and Aarabic words, but this contains, as its base, the old language of the country—a tongue analogous in some respects to the Semitic dialects, but in others of a construction which may be called Hamitic, or allied to the African. The great peculiarity of the hieroglyphic language is, that the verbal root both of the nouns, adjectives, and verbs remains unchanged, and that the dual and plural are made by postfixes, the cases of the nouns formed by prepositions, and the tenses of the verbs by the prefixing of the declined abstract auxiliary verbs, Au, An, or Kheper, to be; or by the affixing of the pronouns *a*, *k*, *t*, *f*, *s*, *nen*, *ten*, *sen*, preceded by prepositions, to the verbal roots. The pronouns are either detached and prefixed or affixed, and the prepositions are either simple or compound; many remarkable forms of the last class existing in the language. There is great vagueness in their employment, and their meaning is often abnormal, and defined only by the context.

Considered as the most ancient written language, the hieroglyphs throw great light upon comparative philology, the relative antiquity of various words and locutions, the general construction of language itself, and the development of picture-writing into the abstract ciphers of sound, called letters. A great portion of the words are similar to the Semitic, either directly or indirectly; thus *iuma*, the sea, is like the Hebrew *yam; kaf*, an ape, like *qof*. The majority are, of course, purely Coptic; but at the peoriod of the 19th dynasty, about B.C. 1300, many Hebrew, Syriac, and Aramaic words were introduced into the language by the progress of the Egyptian arms to the East, and such words appear as *bata* for *Beth*, a house, *makaturu* for *Migdol*, a tower, and others; they are, however, rare and few compared to the body of the language. Many other words appear to be Indo-Germanic. It is now thought that Hitite characters give some indications of an Egyptian origin. For the literature, see PAPYRUS.

The invention of hieroglyphs, called *Neter kharu*, or 'divine words,' was attributed to the god Thoth, the Egyptian Logos, who is repeatedly called the scribe of the gods, and lord of the hieroglyphs. Pliny attributes their invention to Menon. The literature of the Egyptians was in fact styled Hermaic or Hermetic, on account of its supposed divine origin, and the knowledge of hieroglyphs was, to a certain extant, a mystery to the ignorant, although universally employed by the sacerdotal and instructed classes (see HERMES: HERMETIC BOOKS). To foreign nations, the hieroglyphs always remained a mystery; though Moses is supposed to have been versed in the knowledge of them (*Philo*, vita Moysis); but Joseph is described as

conversing with his brethren through interpreters, and does not appear to allude to hieroglyphic writing. The Greeks, who had settled on the coast as early as B.C. 6th c., do not appear to have had more than a colloquial knowledge of the language; and though Solon, B.C. 538, is said to have studied Egptian doctrines at Sebennytus and Heliopolis, and the doctrines of Pythagoras are thought to have been derived from Egypt, these sages could have acquired their knowledge only from interpretations of hieroglyphic writings. Hecatæus (B.C. 521) and Herodotus (B.C. 456), who visited Egypt in their travels, obtained from similar sources the information that they have afforded of the language or monuments of the country. Democritus of Abdera, indeed, about the same period (B.C. 459), had described both the Ethiopian hieroglyphs and the Babylonian cuneiform, but his work has disappeared. After the conquest of Egypt by Alexander, the Greek rulers began to give attention to the language and history of their subjects, and Eratosthenes, keeper of the museum at Alexandria, and Manetho, high-priest of Sebennytus, had drawn up accounts of the national chronology and history from hieroglyphic sources. Under the Roman empire, in the reign of Augustus, one Chæremon, keeper of the library at the Serapæum, had drawn up a dictionary of the hieroglyphs; and both Diodorus and Strabo mention them, and describe their nature. Tacitus, later under the empire, gives the account of the monuments of Thebes translated by the Egyptian priests to Germanicus; but after his time, the knowledge of them beyond Egypt itself was exceedingly limited, and does not reappear till the 3d and subsequent centuries after Christ, when they are mentioned by Ammianus Marcellinus, who cites the translation of one of the obelisks at Rome by one Hermapion, and by Julius Valerius, author of the apocryphal life of Alexander, who gives the translation of another. Heliodorus, a novelist, A.D. 400, describes a hieroglyphic letter written by Queen Candace (iv. 8). The first positive information on the subject is by Clement of Alexandria (A.D. 211), who mentions the symbolical and phonetic, or, as he calls it, cyriologic nature of hieroglyphics. Porphyry (304) divides them also into cœnologic or phonetic, and enigmatic or symbolic. Horapollo or Horus-Apollon, supposed to have lived about 500, wrote two books explanatory of the hieroglyphs, a rude, ill-assorted confusion of truth and fiction, in which are given the interpretation of many hieroglyphs, and their esoteric meaning. After this writer, all knowledge of them disappeared till the revival of letters. At the beginning of the 16th c. (1529), these symbols first regained attention, and soon afterward Kircher, learned Jesuit, pretended to interpret them by vague esoteric notions derived from his own fancy, on the supposition that the hieroglyphs were ideographic, a theory which barred all progress, but was held in its full extant by the learned, till Zoega, at the close of the 18th c. (1787), first enunciated that the ovals or cartouches contained royal names, and that the hieroglyphs, or some of them, were used to ex-

press sounds. More monuments were known, and juster ideas had begun to dawn on the European mind; and the discovery by the French, 1799, of the so-called Rosetta Stone, a slab of black granite, having inscribed upon it, first in hieroglyphics, secondly in demotic or enchorial (a cursive popular form of writing extant at the period), thirdly in Greek, a decree of the priests of Egypt assembled in synod at Memphis, in honor of Ptolemy V., gave the first clue to the decipherment. The first attempts, indeed, were made on the demotic text by Silvestre de Sacy with some success; but it was soon discovered that the demotic was not purely alphabetic. Crude notions of the ideographic nature of the hieroglyphs prevailed till Dr. Young, 1818, first gave out the hypothesis, that the hieroglyphs were used as sounds in royal proper names. He was led to this conclusion by tracing hieroglyphs through the cursive hieratic to the more cursive demotic; and as this last was known to be alphabetic, he deduced that the corresponding hieroglyphic signs were so. In this manner, he came to the conclusion that the first hieroglyph in the name of Ptolemy  in the Rosetta Stone (a mat) represented a P; the second (hemisphere) a T; the third (a loop) he supposed to be superfluous; the fourth (a lion) he read OLE; the fifth and sixth, the syllable MI; and seventh, the back of the seat, and S. Unaided by bilingual monuments, he assayed to decipher the name of Berenice, and altogether established the value of five hieroglyphs as letters out of two names, but was unable to proceed further. Champollion, 1822, by means of an inscription found on an obelisk at Philæ, which had at the base a Greek inscription, recognized the name of Cleopatra, and by comparison with that of Ptolemy, at once proved the purely alphabetic, not syllabico-alphabetic nature of the signs. Extending the principle, he read by its means the names of the Greek and Roman, and finally those of the native monarchs. It was soon seen that the same hieroglyphs as those used in these names were extensively used in the texts for words, and these words turned out, in most instances, analogous to the Coptic. Although the discoveries of Champollion were received by many of the learned in Europe with distrust, yet his method of research was slowly adopted by Rosellini and Salvonini 1832, and subsequently extended methodically by Lepsius 1837, and by Bunsen, Hincks, De Rougé, Birch, Goodwin, Chabas, Brugsch, and others.

The method of interpretation adopted has been strictly inductive, the value of the characters being deduced from the equation of sounds, or homophones of similar groups. The meaning of the groups or words has been determined by examining all known instances in which they occur in passages capable of being interpreted, that of the ideographs by observing the form of the symbols; many of them have been made out from the pictures which they explain, or the phonetic groups which accompany them. A careful comparison has been instituted with correspond-

ing Coptic and Hebrew roots when they exist. In short, a careful principle of induction has been applied to the study of the hieroglyphs.

The discovery of another trilingual inscription, that of the tablet at San or Tunis, recording a synodical act of the priests in the reign of Ptolemy Euergetes II., B.C. 238, has confirmed the results obtained by Egyptologists, the meaning of almost all the words having been previously determined; while the power of reading all documents and inscriptions afforded by their researches has brought resuscitation of a knowledge of the history, science, and literature of the ancient Egyptians. The study has long passed into the category of a recognized branch of oriental learning, and the researches have assumed a more critical form. This has been owing to the number of students, and the abundance of material extant and published. The doubts with which the interpretations were at first received have succumbed to the conviction that nothing but a current system of interpretation could have obtained such logical results. Whatever doubt may exist as to minor details and more delicate shades of language, all the grammatical forms and three-fourths of the words of the old Egyptian language have been established.

The hieroglyphs stood in the same relation to the other two forms of writing the character, called hieratic and demotic, as type does to handwriting. Their use was chiefly for official inscriptions on public or private monuments, religious formulæ and prayers, and rituals or hermetic books (see PAPYRUS). The most remarkable hieroglyphic inscriptions are—that of Una, recording the conquest of the lands of the negroes at the time of the 6th dynasty; in honor of Khnumhetp at Benihassan, recording the investment of his family; the campaigns of Ahmes against the Hykshos at El-Kab; the annals of Thothmes III. at Karnak, the campaign of Rameses II. against the Khita, and the treaty with them; the account of the tank for gold-washings in the reign of Seti I. and Rameses II. at Kouban and Redesich; the invasion of Egypt in the reign of Meneptah by the allied forces of the Libyans, Maxyes, Achaioi or Greeks, Sicilians, Etruscans, Lycians, and other people of the basin of the Mediterranean; the star-risings on the tomb of Rameses V.; the journey of the ark of Khons to Bakhtan, in the reign of Rameses X.; the account of Cambyses and Darius on the statue of the Vatican; the above cited synodical act of the priests in honor of Ptolemy Euergetes II., and that (on the Rosetta stone) of the priests assembled at Memphis in the reign of Ptolemy V.; the sepulchral tablets of the family of Pasherenptah; and the long series of sepulchral tablets of the bull Apis found in the Serapeion, recording the birth, installation, and death of the bulls from the 18th dynasty to the Persians.

In connection with the H. are two modes of writing them, first the *hieratic*, a kind of abridged hieroglyphs. The number of these written characters is fewer than that of the hieroglyphs, the generic determinatives being more employed, and the vocalic complements of the consonants

being constantly written, in order to distinguish similar forms. This writing was more extensively used than the hieroglyphic, being employed for state papers, legal documents, memoranda, accounts, religious books, rituals, and all the purposes of private and public life. Books were generally written in hieratic. It commences as early as the 4th or 5th dynasty, and terminates only about the 3d or 4th c. after Christ. At the earliest period, it is occasionally written perpendicularly, but it was afterward written only horizontally, and has generally portions in red ink, corresponding to our initial illuminated letters or rubrics. For the literary contents of these rolls, see PAPYRUS. Some, indeed, have supposed that the hieratic alphabet gave rise to the Phœnician, and have endeavored to trace the Phœnician alphabet from hieratic sources. But though much ingenuity has been expended in this inquiry, the precise source of Phœnician writing remains involved in obscurity, the principal fact being, that a syllabary existed long prior to the Phœnician alphabet, which did not reach the perfection of the Greeks, owing to the suppression of vowels. The second kind of hieroglyphic handwriting was the *demotic*, or so-called enchorial. It was a still further reduction of the hieratic, simpler forms being used, while the complements are not used, and it approaches still nearer the alphabetic system. It contains an alphabet of 42 letters, and a syllabary of 48 characters, and is less rich in the number of determinatives and ideographs than the hieratic. It is, like all cursive hands, more difficult to decipher than hieratic. It was introduced into the Egyptian graphic system about the commencement of the 26th dynasty, B.C. 6th c., and continued in use till the 3d c. after Christ. This was the last native form of writing in Egypt, the early Christians having introduced the Greek alphabet, with a few characters borrowed from the demotic. This script was rarely used for public monuments, though it appears on the Rosetta stone; but it was universally employed for contracts, public documents, and occasionally for religious formulæ, owing to the decreasing knowledge of hieroglyphics. At the time of Clement, it was the first learned by beginners. With it the Greek language began to appear in public use.

Besides the Egyptian H., there are those of the Aztecs or Mexican, a kind of pure picture-writing, the names of monarchs, towns, and other things being painted by the objects which corresponded to their names. While in their historical writings the events themselves were portrayed, the number of the years of the reign of the king was indicated by placing in a line *en potence* in the picture the symbols of the years of the Aztec cycle, which were named after plants and animals. The Mexican hieroglyphs, in fact, consisted of conventional pictures, and they had no means of expressing grammatical form or any structural parts of a language. This mode of pure picture-writing prevailed not only in Mexico, but among the nations of Central America. The knowledge of these symbols has unfortunately been almost lost since the Spanish conquest, the

meaning of only a few having been rescued from oblivion in the 16th c., when the greater part of the Aztec MSS. was destroyed by the Spanish ecclesiastics. It has indeed been asserted, that the monks used these symbols according to their *sounds*, to write the Lord's Prayer and other formulas; thus: , a flag, pronounced *Pantti*, was used for the syllable *Pa;* , a stone, *Tetl* for *tĕ*, the two expressing *Pater;* a cactus fruit, *Nochtli*, for *Noch;* and a stone , as above for *te:* these four groups expressing *Pate*(r) *Nochte*, or *Noster;* and so forth. This seems to show the development of a phonetic system, but it was never extensively used, on account of abhorrence of the Aztec idolatry.—The term hieroglyphic was used also by the writers of emblemata or devices, symbolizing Gnomic sentences taken from the Greek and Latin poets, and having no relation to Egyptian hieroglyphs.—In recent times, too, the astrological almanacs have had their symbolical representations and supposed prognostics of future events, which they called hieroglyphs.—Zoega, *De Origine Obeliscorum* (fo. Romæ 1797); Young, *Archæologia* (1817, XVII. 60); *Encyclop. Britannica* (8th ed.); Champollion, *Précis du Système Hieroglyphique* (1824); *Grammaire Egyptienne* (1841–61); *Dictionnaire* (1841); Lepsius, in the *Ann del' Instituto Arch.* (1828); Birch, *Introduction to the Study of the Hieroglyphics* (1857), Brugsch, *Grammaire Démotique* (Berl. 1855), *Wörterbuch* (1867–8), *Grammatik* (1872); De Rougé, *Etude d'une Stêle Egyptienne* (1858); Chabas, *Papyrus Magique d'Harris* (1861); *Zeitschrift. f. ägypt. Sprache* (1863–74); Bunsen, *Egypt's Place* (V. 1867).

HIERONYMITES, *hī-ĕr-ŏn'ĭ-mīts*, or HIERONYMIANI, *hī-ĕr-o-nĭm'ĭ-an-ī:* one of the many hermit orders (q.v.) established in the 13th and 14th c. The H. grew out of the third order of St. Francis: see FRANCISCANS. Some of the followers of Thomas of Siena, one of the Franciscan rigorists, having established themselves in various places among the wild districts which skirt the Sierra Morena, by degrees formed into a community, and obtained 1374 the approval of Pope Gregory XI., who confirmed their rule, which was founded on that of St. Augustine. The institute extended into other provinces of Spain, and also into Portugal; it was subsequently established in Italy, Tyrol, and Bavaria, where they subsisted till 1688.

HIERON'YMUS: Christian father: see JEROME.

HIEROPHANT, *hī-ĕr'o-fant*, or MYS'TAGOGUE: priest who presided over the mysteries at Eleusis; always selected from the family of Eumolpus, who was regarded as founder of the order and the first Hierophant. The H. was required to be a man of ripe years, without any physical defect, having a fine voice, and of spotless character. He was forbidden to marry, but it is probable that married men were likewise appointed H., and were merely prohibited from forming a second marriage. In the mysteries, the H. represented the Demiurge or creator of the universe. He alone was authorized to preserve and explain the unwritten

laws, to introduce candidates into the temple of Eleusis, and gradually initiate them into the less and greater mysteries. On this account, he was likewise styled *Mystagogue* and *prophet*, and no one was allowed to utter his name in the presence of an uninitiated person. At public solemnities he carried the image of the goddess splendidly attired.

HIESTER, *hē'stĕr*, Joseph: 1752, Nov. 18–1832, June 10: b. Bern, Penn.: soldier and statesman. He was bred to farm labor, received a dist. school education, became a clerk in Reading, Penn.; raised and equipped a co. of vols. for the revolutionary army, was in the battles of Long Island and Germantown, promoted col., was a prisoner in the prison-ship *Jersey*, served in the constitutional conventions 1776, 90, the Penn. house 5 years, and senate 4 years, congress 1797–1805, 1815–20; gov. of Penn. 1821–23; and was commissioned maj.gen. of state militia 1807.

HIGGINSON, *hig'ĭn-son*, Ella Rhoads, American novelist and poet: b. Council Grove, Kan., 1862. She was married to R. C. Higginson and has passed her life mainly in the vicinity of Puget Sound, Wash. She has contributed much to periodicals, and her work, which has a distinctly original flavor, has attracted much attention from its vigorous presentation of life on the upper Pacific slope. Her most noteworthy book is *Mariella, or Out West*, an extremely strong novel (1902); and other works of hers are *The Flower that Grew in the Sand* (1896); *From the Land of the Snow Pearls* (1897); *A Forest Orchid* (1897); and several collections of poems.

HIGGINSON, Francis: 1588–1630, Aug. 6; b. England: clergyman. He graduated at Cambridge Univ., was ordained pastor at Claybrooke, a Leicester parish, 1615, became a Puritan and was deprived of his parish, spent several years preparing candidates for the univ., accompanied the expedition of the Mass. Bay Co. to New England 1628, became 'teacher' of the congregation at Salem, Mass., 1629, July 20, and drew up their first confession of faith.—His son, John Higginson, 1616, Aug. 6—1708, Dec. 9; b. Claybrooke, England, came to America with his father, was short-hand reporter of the synod 1637, chaplain at the Saybrook (Conn.) fort, ordained pastor of the church at Salem, Mass., which his father had founded, and preached there from 1660 till death.

HIGGINSON, Francis John, American rear-admiral: b. Boston, 1843, July 19. He was graduated from the United States Naval Academy in 1861 and served in the United States navy during the civil war becoming lieutenant-commander in 1866. He was commander of the Massachusetts during the Spanish-American war 1898, was promoted commodore that same year, and rear-admiral in March 1899. He became chairman of the Light House Board 1898, August, commander-in-chief of the North Atlantic station 1901, May 1, commandant of the Washington navy yard 1903, July 1, and was retired 1905, July 19.

HIGGINSON, Mary Thacher, American author, wife of T. W. Higginson (q.v.): b. Machias, Maine, 1843, Nov. 27. She has written *Seashore and Prairie* (1876); *Room for One More* (1879); *Such as They Are* (1893), and *The Playmate Hours* (1904), poems written in collaboration with her husband.

HIGGINSON, Sarah Jane Hatfield, American writer: b. Philadelphia, 1840, Jan. 15. With her first husband, a Dutch jurist, she lived for several years in the Dutch East Indies, and after his death returned to the United States, where she was married to Stephen Higginson, a former American consul in the Dutch East Indies. She has written: *A Princess of Java: a Tale of the Far East* (1887); *Java, the Pearl of the East*, a book of travel (1890); *The Bedouin Girl.*

HIGGINSON, Thomas Wentworth: author: b. Cambridge, Mass., 1823, Dec. 22. He graduated at Harvard College 1841 and the Cambridge Divinity School 1847, was ordained pastor of the First Religious Soc. (Unit.), Newburyport, Mass., 1847, defeated as free-soil candidate for congress 1850, pastor of the Free Church, Worcester, Mass., 1852–58, brig.gen. on Gen. James H. Lane's staff in the Kan. free state movement 1856, retired from the ministry to apply himself to literature 1858, was appointed capt. 51st Mass. vols. 1862, Sep., promoted col. 1st S. C. vols. (subsequently 33 U. S. colored troops) 1862, Nov.; captured Jacksonville, Fla.; was wounded at Wiltown Bluff, S. C., 1863, Aug.; and resigned from the army from disability 1864, Oct. He was a member of the Mass. legislature and chief of the governor's staff 1880–1, and member of the Mass. board of education 1881–83, and has long been an earnest advocate of woman suffrage, the higher education of women, and the advanced education of the young of both sexes. He was appointed military and naval historian of Mass. for the civil war period 1889, June. He is a polished and vigorous writer; has contributed numerous essays to *The Atlantic Monthly;* compiled with Samuel Longfellow *Thalatta*, a vol. of seaside poetry (1853); translated the *Complete Works of Epictetus* (1865); edited *Harvard Memorial Biographies*, 2 vols. (1866), and *Brief Biographies of European Statesmen*, 4 vols. (1875–77); and published *Outdoor Papers* (1863); *Malbone, an Oldport Romance* (1869); *Army life in a Black Regiment* (1870); *Atlantic Essays* (1871); *The Sympathy of Religions* (1871); *Oldport Days* (1873); *Young Folks' History of the United States* (1875); *History of Education in Rhode Island* (1876); *Young Folks' Book of American Explorers* (1877); *Short Studies of American Authors* (1879); *Common-Sense about Women* (1881); *Life of Margaret Fuller Ossoli* (1884); *Larger History of the United States* (1885); *The Monarch of Dreams* (1886); *Hints on Writing and Speech-making* (1887); *Women and Men* (1887); *Travelers and Outlaws* (1888); *The Afternoon Landscape*, poems (1889); *Life of Francis Higginson* (1891); *The New World and the New Book* (1891); *Concerning All of Us* (1892); *Such As They*

Are, poems (1893); *English History for Americans* (1893); *Massachusetts in the Army and Navy* 1861–5 (2 vols. 1895–6); *Cheerful Yesterdays* (1898); *Tales of the Enchanted Islands of the Atlantic* (1898); *Old Cambridge* (1899); *Contemporaries* (1899); *Collected Works* (7 vols., 1900); *Henry W. Longfellow*, in *American Men of Letters*, series (1903); *John G. Whittier* in *English Men of Letters*, series (1903); *A Reader's History of American Literature* (1903); *Part of a Man's Life* (1905); *History of the United States* (1905); etc.

HIGGLE, v. *hĭg'l* [prov. Ger. *hitzler*, one who carries about meal or corn on horseback for sale: Swiss, *hodeln*, to traffic in corn]: *literally*, to carry about provisions for sale; to be difficult in making a bargain; to chaffer. HIGGLING, imp. *hĭg'lĭng:* N. the being tedious and nice in making a bargain. HIGGLED. pp. *hĭg'ld.* HIGGLER, n. *hĭg'lẽr*, one who chaffers; one tedious in making a bargain.

HIGGLEDY-PIGGLEDY, ad. *hĭg'l-dĭ-pĭg'l-dĭ* [imitative of confusion]: in *familiar language*, confusedly; topsy-turvy; chance-medley.

HIGH, a. *hī* [AS. *heah;* Goth. *hauhs;* Icel. *ha;* Ger. *hoch;* Dan. *höi*, high—*lit.*, raised or bunched up]: far upward; elevated; lofty; noble; honorable; solemn; violent; boastful; principal or chief; strong or powerful; dear in price; full or complete—applied to time; acute, as applied to music: AD. aloft; greatly; with deep thought. HIGH'LY, ad. *-lĭ*, in a great degree with esteem; in *OE.*, proudly; arrogantly. HIGH'NESS, n. *-nĕs*, elevation; title given to princes or persons of rank: the titles 'Your Highness' and 'Your Grace' both were used in England in former times in addressing the sovereign, but were supplanted by 'Your Majesty' toward the end of the reign of Henry VIII. The children of royal personages are addressed 'Your Royal Highness;' those of emperors, 'Your Imperial Highness.' The sultan of Turkey is addressed as 'Your Highness.' ON HIGH, aloft. HIGH ADMIRAL, the chief admiral. HIGH ALTAR, the principal altar (see ALTAR). HIGH AND DRY, completely out of the water; out of reach of the waves. HIGH ART, that elevated style which disarms criticism by avoiding the slightest attempt at meretricious display. HIGH BAILIFF, chief officer of some corporate towns in England—the name being distinguished from Bailiff, which conveys no honor and is applied to the lowest class of officers who execute writs against debtors. HIGH-BLOWN, much inflated. HIGH-BORN, of noble birth. HIGH CHURCH, the party in the Church of England or other ecclesiastical bodies, who hold strong views of the authority and jurisdiction of the church. HIGH-COLORED, glaring; exaggerated. HIGH COMMISSION COURT, in *hist.*, tyrannical court established by Queen Elizabeth to reform the church, which much abused its powers, now abolished. HIGH CONSTABLE: (see CONSTABLE). HIGH COURT OF JUSTICE: (see CHANCERY; COMMON LAW, COURTS OF; EQUITY, COURTS OF). HIGH DAY, a great feast-day; a day of great

ceremonies. HIGH-FED, pampered. HIGH-FLIER, one who carries his opinions or claims to extravagance. HIGH-FLYING, extravagant in opinions or claims. HIGH-FLAVORED, having a strong flavor. HIGH-FLOWN, swelled; proud; extravagant. HIGH-HANDED, violent; overbearing. ON HIS HIGH HORSE, in a state of high excitement and glee; displaying arrogant, boastful, and offensive conduct. HIGH LATITUDES: (see under LATITUDE). HIGH LIFE, the manner of life among the aristocracy, or persons of wealth HIGH LIVING, the feeding upon rich and costly food. HIGH-LOWS, *-lōz*, a boot extending up to the ankle only. HIGH MASS, mass on great occasions, and in a specially formal and solemn manner. HIGH-METTLED, having a proud or ardent spirit. HIGH MINDED, having honorable pride. HIGH MISDEMEANOR, an offense or crime closely bordering on treason. HIGHMOST, in *OE.*, highest; topmost. HIGH PLACE, an elevation or mound used in anc. times for worship and sacrifices. HIGH-PRESSURE ENGINE, a steam-engine in which the steam is not condensed. HIGH-ROAD, that used by the public for traffic, vehicles, etc. —so named as having been raised above the usual level of the country in many parts of it. HIGH SEA, the ocean beyond the limits of the waters usually assigned to nations —that is, beyond the limits of three miles. HIGH-SEASONED, food well spiced. HIGH-SOUNDING, pompous noisy. HIGH-SPIRITED, full of life and spirit. HIGH STEWARD, in *England*, a legal peer specially appointed by the crown to act as speaker or chairman of the peers who sit at the trial of another peer indicted for treason or felony; he votes with the rest: to be tried by the court of the High Steward is one of the privileges of the British peerage. HIGH TIME, time at which a thing must be attended to; quite time. HIGH-TONED, high in sound or in moral principles. HIGH TREASON, the greatest offense that can be committed against a government, assigned by statute to various crimes —as, compassing the death of the sovereign, rebellion against the state, killing certain high officers, counterfeiting the great seal, etc. (see TREASON). HIGH-WATER, the time when the tide has flowed to its furthest point. HIGH-WATER MARK, line reached by the furthest flow of the tide. HIGH-WROUGHT, *-rawt*, accurately and elaborately finished; denoting a highly excited mental state; in *OE.*, tumultuous; seething.—SYN. of 'high': raised; exalted; difficult; extreme; abstruse; ostentatious; arrogant; proud; tall; severe; oppressive; illustrious; powerful; tempestuous; loud; tumultuous; turbulent; ungovernable; full; complete; dear; exorbitant; capital; great; supercilious; ostentatious.

HIGHER CHRISTIAN LIFE, THE: name used to describe a superior state of Christian grace which, many persons say, can be and has been reached in this life through the work of the Spirit of God in the heart. They call it also, Full Salvation, Entire Holiness, and Christian Perfection. So far as genuine Christian experience actually attained in this life is concerned the difference between this view and the opinion generally held by

Christians that sanctification is a progressive work to be diligently prosecuted but not perfectly finished in this life, seems to arise chiefly from confusion of thought. For while its advocates speak of 'Entire Holiness as a complete cleansing from moral defilement or sin,' they say also that 'it is to be distinguished from that Christian maturity which is not to be attained this side of heaven.' While they affirm that it can be gained in this life they confess also that it may be lost. They even who retain their entire holiness are liable, it is admitted. to 'involuntary transgressions which are infirmities needing atonement, but are not sins.' Above all, the advocates of this view insist that the standard of duty set up by the gospel has been lowered in compassion for the diminished powers of fallen man. Reaching the full height of this lowered standard seems to be called by them Christian perfection; whereas the acceptance and the reaching of only an inferior standard has usually been deemed imperfection, or a lower life.

HIGHER CRITICISM, The: critical investigation of the materials, style, and minor details of the books of the Bible, with a view to deciding their authorship, date, etc. The attention given in modern times to ancient writings (after centuries of neglect and consequence ignorance) quickly led to many critical inquiries concerning the genuineness, date, and interpretation of the various books of the Bible. As external evidence was often wanting critics were led to examine the contents, diction, and style of the books themselves. Such examinations, being gradually extended in their scope, variety, and depth, at length were called by Eichhorn, about a century ago, the Higher Criticism—the name by which they are now best known.

Eichhorn and many others after him have laboriously appled these critical tests to the Scriptures, and especially to the Old Testament. As an illustration of their work, reference may be made to the extreme theories which some of them advanced concerning the Pentateuch, as to its authorship, structure ,and date. I. This portion of the Scriptures which ordinary readers accept as, in the main, one continuous production, is adjudged by the keen scrutiny of the higher critics to be made up of several documents, by different authors, which were at some subsequent time, woven together by some who, for want of a more definite name, is called a redactor. This combined narrative was, after a time, as the critics determine, again modified and enlarged by other redactors; and so, through successive stages, the Pentateuch reached its present size and character. In the progress of the redactions not only were large sections combined together; but often also single sentences and parts of a sentence, taken from different documents, were formed into a continouus narrative with a skill in joining the fragments together which must at times have equalled even the acumen of the critics in determining where the joinings were made. II. These documents and redactors have been discovered solely by critical skill. There are no historical records to prove their existence and no tradi-

tional memories to imply it. The higher criticism alone has brought them to light. II. As the critics draw their conclusions from their own judgments concerning qualities of style, the development of laws, and the order in which one enactment followed another, several conflicting divisions of the Pentateuch have been discovered; each critic being confident concerning his own achievement, and one often setting aside the equally certain discovery of another. The Higher Criticism, even in this extreme aspect of it, greatly promotes genuine Biblical knowledge, not only by bringing to light some unnoticed facts, but especially through the counter investigations which it impels.

HIGHER EDUCATION. See EDUCATION IN THE UNITED STATES.

HIGHEST GOOD. See ETHICS.

HIGH-FALUTIN, a. *hī-făl-ō'tĭn* [a slang phrase]: applied to a grandiose and bombastic style of speech or writing; much sound and little sense; fustian.

HIGH-JINKS, or HY-JINKS, n. *hī-jĭngks* [see JINK]: formerly in *Scot.*, boisterous and hilarious merriment, in which the dice was thrown to determine the person on whom some ludicrous penalty should be imposed, or who should be called upon to empty his cup of liquor; hilarious and larking merriment.

HIGH-JOINT COMMIS'SION. See GENEVA ARBITRATION.

HIGHLAND, n. *hĭ'lănd* [*high*, and *land*]: a mountainous region. HIGH'LANDS, a district in Scotland so called. HIGH'LANDER, n. one who is a native of the Highlands of Scotland, or of any mountainous district of a country.

HIGH'LAND REG'IMENTS: regiments in the British army, in which nearly all the officers, and a large proportion (about 80 per cent.) of the men are Scotch. They wear the Highland dress. For the origin of the first of these regiments, the 42d, abt. 1730, see BLACK WATCH. Seven other Highland regiments were raised, 1777–1805. Since 1881 these troops have been arranged in battalions, of which the total force may be considered to equal about 11 regiments.

HIGHLANDS, *hī'landz:* the higher parts of a country. e.g., Highlands of the Hudson, in N. Y. The term is applied specially to a particular district in Scotland, which has no political or civil boundary. Separated by only a vague line of demarcation from the division called the Lowlands, the Scottish Highlands comprise that portion of the n. and n.w. of Scotland in which the Celtic language and manners have to some extent lingered until modern times. The Highland line, as it is usually called, extends diagonally across the country from Nairn on the Moray Firth to Dumbarton on the Clyde; but the mountainous part of the counties of Banff, Moray, Aberdeen, Kincardine, and Perth also are understood to be included in the designation Highlands. Caithness might be excluded as being gener-

ally level; but throughout the Highlands there are rich level tracts, none being more so than the e. division of Ross-shire. The Hebrides (q.v.) or Western Isles are included in the Highlands, but the isles of Orkney and Shetland, though to the north, are distinctly excluded, by reason of the Norwegian origin of the inhabitants.

The Highlands are full of lofty hills, some green and pastoral with tracts of heath, others rugged and bare, varying in height from 1,000 to 4,000 ft., and having generally narrow valleys between, or else lakes and arms of the sea, called *lochs*. Besides the grander features, there are impetuous mountain torrents, picturesque ravines and valleys or glens, in which, and on the sides of the hills, are seen the huts of the aborigines. Perhaps the most remarkable feature in the country is the line of valleys from Inverness to Fort-William, in which lies a series of navigable lochs, united by artificial channels to form the Caledonian Canal. Growing up under a system of clanship, the state of society in the Highlands was antiquated and unsatisfactory, in a national point of view; while the country was almost impenetrable to travellers, or to any species of traffic. The first great attempt to reform this state of affairs was the opening up of the country by roads in different directions, under the superintendence of General Wade, about 1725–6. The next great act of melioration was the abolition of Heritable Jurisdictions (q.v.), including the ancient privileges of the heads of clans, about 1748. Then there was the planting of schools and churches. And lastly much was done by the establishment of the Highland and Agricultural Soc. 1784. The ancient patriarchal system has given place to improvements as regards communications, agriculture, dwellings, education, and other modern conditions, including a gradual substitution of English for the Gaelic language. Latterly, there has been a keen spirit of progress in the Highlands. Great numbers of the Celtic inhabitants, who had little chance of improving their circumstances on the spot, have been dispossessed, and their place taken by stock-farmers with capital from the Lowlands: (see SUTHERLAND). While a new character has thus been given to extensive Highland pasturages, the value of estates has been further remarkably advanced by their being let for the pursuit of game to sportsmen, chiefly persons of rank and opulence from England. Inverness (q.v.) is usually spoken of as the capital of the Highlands. See the Highland counties individually. See Dr. James Browne's *History of the Highlands and the Highland Clans* (4 vols. 1838, new ed. 1848); Keltie's *History of the Scottish Highland Clans and Regiments* (2 vols. 1875); Anderson's *Guide to the Highlands and Islands of Scotland.*

HIGH PLAC'ES [Heb. *Bamoth*]: name in Scripture for certain places where illicit worship, usually idolatry, was performed by the people of Israel. The practice of erecting altars on elevated situations was common in ancient times, and originated in the belief that hill-tops were nearer

heaven, and, therefore, the most favorable places for prayer and incense. The fathers of the Jewish nation acted in this respect like their neighbors. Abraham, we are told, built an altar to the Lord on a mountain near Bethel. Moses, however, true to his grand aim of securing national strength and purity by a vigorous system of isolation, gave a law prohibiting the practice for the future, on the ground that the spots which the Israelites would be compelled to choose had been already polluted by idolatrous services. In spite of the vehemence with which the high places are again and again denounced in the Pentateuch, the prohibition seems to have been slow in producing the desired effect—if, indeed, it ever completely accomplished it. During the whole eventful period of the Judges the prohibition was not only practically obsolete, but there were cases doubtless counted as exceptional—e.g. those of Gideon and Manoah, who built altars on high places by Divine command (Judges, vi. 25, 26; xiii. 16–23). Similarly the injunction was set aside by Samuel at Mizpeh and Bethlehem, by Saul at Gilgal, by David, by Elijah on Mount Carmel. The explanations given by the rabbis of these contradictions between the conduct of the prophets and kings of the Hebrew people, and the commands of their great lawgiver, are absurd. The fact probably was that even in the rigid Mosaic law, a higher law of *necessity* was recognized in matters merely external and involving no inherent wickedness; though this could have applied only to individual cases or to special periods. During certain periods, however, the law seems to have been quite disregarded. Whatever may be the true explanation, it is quite certain that worship in high places was almost universal in Judea, both during and after the time of Solomon. The results of this illegal practice were such as might have been anticipated: the people erected altars not only to Jehovah but also to Baal, and from worshipping in idolatrous places, proceeded to worship idols themselves. At a later period (see Books of Kings and Chronicles) a series of vigorous efforts was made by the more pious monarchs to suppress the practice, and after the time of Josiah, it seems to have been finally abandoned.

HIGH-POTENTIAL SYSTEM: in electric distribution, a system of conductors, generators, and translating devices in which the pressure or voltages is relatively high. Specifically, an electric distributing system, which, according to fire insurance rules, has within it a pressure of over 550 volts and less than 3,500 volts.

HIGH'-PRIEST [Hebr. *Kohen haggadol*, or emphat. *Kohen*, Gr. *archiereus*, Lat. *primus pontifex*, etc.]: the chief of the Jewish priesthood. His dignity was hereditary in the line of Eleazar, son of Aaron; and many more restrictions were attached to it than to the ordinary office of a priest. He was allowed to marry only an intact virgin, and one of his own tribe; every ceremonially impure contact even of the dead bodies of his own parents he was strictly forbidden, besides having to abstain from many

other things that might cause any defilement whatever. His functions consisted principally in the general administration of the sanctuary and all that belonged to the sacred service. He alone was allowed to enter the Holy of Holies on the day of atonement, and to consult the Urim and Thummim (q.v.). His costume was of surpassing costliness and splendor, comprising numerous vestments in addition to those of the ordinary priests. This brilliant costume, however, was laid aside by the High-Priest when, on the annual day of atonement, he went to perform the most awful service in the Holy of Holies: a simple garb of spotless white linen—the funeral dress of the Jews in later times—was all that was allowed on that occasion. The revenues of the High-Priest were in the main the same as those of the other priests; but, according to the Talmud, he was to be richer than these, and if his own means were insufficient, he was to be provided with opulent means by his brethren, in virtue of his exalted position; the other priests never addressed the High-Priest but by *Ishi Kohen Gadol* 'My Lord High-Priest.' Before the law, however, the High-Priest was equal to any other Israelite. It is doubtful at what time the office of *Sagan*, or vice-High-Priest, was created. The Talmud, moreover, speaks of a '*Mashiach Milhamah*,' 'Anointed for the war,' an officer who seems to have shared almost the dignity of the High-Priest, and whose special duty it appears to have been to read the proclamation prescribed in Deut. xx. 3, in time of war, and who may have accompanied the troops for celebration of the service in the camp. For further historical and theological points connected with this subject, see PRIESTS; AARON, JEWS.

HIGH SCHOOLS. See EDUCATION IN THE UNITED STATES.

HIGH SEAS: the open sea, including the whole extent of ocean so far as it is not the exclusive property of any particular country. The rule of international law is, that every country bordering on the sea has the exclusive sovereignty over such sea to the extent of three miles from its shore; but all beyond, and which is not within three miles of some other country, is open or common to all countries. The part of sea within three miles' distance is generally called the territorial sea of the particular country, or *mare clausum*. The distinction has little effect on the right of navigation, but as regards fishing it is otherwise. Fishermen have no right to fish within three miles of the coast of another country than their own without a license from the authorities of that country, except as such right is granted by special treaty.

HIGH-SPEED ENGINE: one in which the piston speed exceeds 900 feet per minute. It possesses the advantages of small dimensions and small weight for a given power, and on account of the frequency of its strokes, is capable of meeting variations in loading more quickly than a low-speed engine. Its disadvantages consist in the greater

waste of steam, the greater wear, and the increased danger of the heating of the moving parts. Also, the higher cost of construction and operation.

HIGHT, v. *hīt* [AS. *héht*, named—from *hatan*, to name, to be called: Icel. *heitinn*, named: Goth. *háitan*, to name]: in *OE.*, was or is called; called; intrusted; aimed.

HIGH'WAY, in English Law: the place over which a right is enjoyed by the public, of walking, driving, or riding. In England, it is often called the queen's highway; not because the sovereign has any greater or better right than any of the public, but to denote the impartiality and equality with which all the subjects enjoy the right of way without distinction. In the United States, a highway sometimes means a country road as distinguished from town roads, though this distinction is not generally used.

Highways are distinguished into several kinds. (1.) A footway, where the public have no right except to walk on foot; (2.) A foot and horse-way, where the public have the right of walking or riding on horseback; (3.) A pack, and drift-way—a way used for driving cattle and pack-horses; (4.) A foot, horse, and cart-way, where the public can walk or ride, or use vehicles of all ordinary descriptions. Navigable rivers are also called highways, but this is in rather a figurative sense. Where the right of way belongs not to the public generally, but to the owner o one or two houses and their tenants, this is called a private-way, and is classed among easements.

It has often been disputed, and cannot be said to be yet thoroughly settled, whether a highway must be a thoroughfare—in other words, whether a road which does not lead to any public place can be a highway. The preponderance of authority seems rather in favor of the proposition, that it is essential that the highway be a thoroughfare. The mode in which a road is created is by dedication, or by grant of the owner, or by the necessity of things or act of the legislature, or of the municipal district concerned. Thus, in England, if a person allow the public for four or five years to pass through his fields without stopping them, this will be evidence from which a jury may infer that the owner meant to make a present to the public of the right of way, and he cannot afterward exclude the public, for the maxim holds, 'once a highway, always a highway.' The mode in which a grant of the way is proved, is generally by showing that the public have, from time immemorial, or for a few years without interruption, and with the owner's consent, enjoyed the right of way; for if that is proved, then the law presumes that the right was given by some lost grant. In the United States it has been held in one case that any road which has been used as such by the public for 50 years is a highway. There are also rights of way limited to a particular purpose, which may be proved by immemorial custom, as a way for the inhabitants of a village to or from some place of recognized public resort. One of the incidents of a high-

way is, that if it is foundrous, or out of repair, the passenger is entitled to go over the adjacent land, whoever may be the owner of it, so as to avoid the foundrous part of the road. Another incident of the use of a highway is, that if any obstruction is placed on it, whether in the nature of a gate, or a wall, or even if a house be built too near so as to encroach on the highway, any passenger has a right to abate the nuisance—i.e., he may himself, without any ceremony, remove the obstruction, or demolish the wall, but he must take care not to do more damage than is necessary for the purpose of clearing the road, otherwise he will subject himself to an action. Another incident is, that the public have an absolute right to use every part of it, and to pass to and fro in all directions. Of course, each must comply with certain well-known rules, such as that of giving and taking the road, otherwise, if an accident were to occur, he would be liable for the negligence, if it arose from a neglect of such rules, for these constitute, as it were, the law of the road. It results from this principle, that no person, or body of persons, is entitled to convert part of the highway into any purpose, however useful, other than a highway. In England this principle has been applied so far that when some vestries and surveyors presumed to give leave to a contractor to lay down a 'tramway' or track for horse-cars in the streets (e.g., in London), which was alleged to be a great public improvement, nevertheless, as it practically resulted in giving a monopoly to some persons, and moreover was an obstruction to others, this was held to be a nuisance, and the parties who took part in it were indicted for the obstruction. And on the same principle, it has been held an indictable nuisance for an electric telegraph company to place their telegraph posts on the strips of land at the side of the road; for though it might be thought for the benefit of the public, instead of the reverse, yet as it practically obstructed the public in the free passage from every part of the highway to every other, it was held to be a nuisance. Nothing but an act of parliament can legalize such uses of a highway in England. In the United States, such matters are largely in the control of counties, or of municipal corporations. Such corporations formerly had the right to lay out and open streets with or without consent of property-owners along the line: now it is common to make requisite the consent of a majority of the property-owners—at least this may be said to be the usual requirement in regard to the laying of any kind of track or rails for cars. The law of the road as to team or persons meeting is, in England, that they shall turn to the left: in the United States, that they shall turn to the right.

The soil of the highway, or rather the right to the ground beneath the highway, is presumed to be in the adjoining owners. Thus, if the land on both sides belong to the same owner, then the right to the ground beneath the road belongs to him also; and if the land on one side belongs to a different owner from the land on the other side, then each is presumed to have the right to the ground under the

highway, to the middle line. This rule is more than a mere theory, for though neither of the adjoining owners can ever interfere with the passage of the public, who have an absolute right for ever to use it for every lawful purpose of transit, yet the adjoining owner has all the rights incidental to the property which do not interfere with this public right of passage. Thus, if a mine were discovered under the road, the adjoining owner would have the sole right to dig it and keep the contents; all that he would require to attend to would be, to leave sufficient support to the surface of the road. So, in like manner, where there are strips of land at the side of the road on which trees or grass grow, these belong solely to the adjoining owner, and the public have no right to their use. Another remarkable consequence follows, that if, for example, a gas company or a water company were to presume to take up the highway in order to lay pipes under the surface, this is not only an indictable nuisance as regards the public, inasmuch as it obstructs the use of the road for the time being, but it subjects the company to an action of trespass at the suit of the adjacent owner, whose property consists of all that lies under the surface of the hghway. Another consequence of the same rule is, that if a person is loitering on a highway, not with the intention of using it as a road, but for some other purpose, the courts have held that he may be indicted.

The repair of a highway, in general, devolves on the county, or the town, or on the occupiers of the land in the vicinity; probably for the reason that they use those highways most, and should therefore attend to the necessary repair. In some rare cases, however, the burden of repair is fixed on the owner of the adjoining land, if it can be proved that he has always, from time immemorial, been in the habit of repairing, it being then presumed that there were some good reason for this. But even when bound to repair, the owners of the district cannot be compelled to pay for widening the road. The common remedy, accordingly, when a road is out of repair, is to indict the town, or county concerned, when, if guilty, the proper official will be bound to make a rate, and pay the expenses.

Highways are kept in repair usually by a highway-rate or road-tax levied by the proper officer, who is annually appointed by the taxpayers, and who is vested with the control of the surface of the highway to a limited extent for the purpose of keeping it in due order. Certain specific uses, or rather abuses, of the highway are often forbidden by statute, such as horsemen riding on footpaths, the tethering of cattle on the sides of the highway, playing at games, baiting bulls, lighting fires, firing of squibs, depositing materials, etc., on the highway. In statutes dealing with offenses connected with the highway, such as negligence of carriers, etc., 'highway' is held to include navigable rivers. But railways have been held not to be included in the term highway in a statute assigning the death penalty for robbery on the highway.

Many highways are called *turnpikes*, from the fact of their having toll-gates, bars, or turns across them, and are managed by commissioners or trustees. This is always done by some local legislative act Where a new road is considered to be of great public benefit, the neighboring proprietors obtain a legislative act (or its equivalent) to make it, with powers to take compulsory the requisite land, and to raise money for buying such land, as well as to keep up the road thereafter; and as a means of paying off all this expense, to erect a toll-gate, and levy a tax or toll on all who use the road. Sometimes the soil of the turnpike-road is vested in these trustees. Several exemptions from paying toll may be created by statute, e.g. in the case of funerals, etc. Turnpikes with toll-gates were formerly very numerous in the United States; but are now comparatively few. See TOLL.

HIGH'WAYMAN: one who commits the offense of robbing or assaulting on the highway. See LARCENY; ROBBERY; ASSAULT.

HIG'LER. See HAWKER.

HIGRE, n. *hī'gĕr* [Bav. *hidl*, the rising of the underground water-level: Fris. *hieen*, to rise or swell, as water; Icel. *Ægir*, the sea-god, the sea]: the commotion made in certain rivers by the meeting of the tidal wave and the river current, the bore; a sudden inundation of the sea—also named EAGRE, EGRE, HYGRE, or AKER.

HILARIA, *hĭ-lā'rĭ-â:* ancient festivals in Rome, annually celebrated Mar. 25, in honor of nature's resumption of vigor. Libations were drank to the mother of the gods, her statue was carried through the streets of the city with demonstrations of joy, business and every appearance of sorrow and mourning were suspended, gayety and pleasure ruled the city, and the people were granted the privilege of dressing themselves as they chose even to assuming magisterial robes.

HILARIOUS, a. *hĭ-lā'rĭ-ŭs* [L. *hĭlărĭs;* Gr. *hilărŏs*, merry, joyful (see HILARIA)]: mirthful; merry. HILAR'ITY, n. *-lăr'ĭ-tĭ* [F. *hilarité*—from L. *hilarĭtātem*]: mirth excited by social pleasure; gayety.—SYN. of 'hilarity': joviality; jollity; glee; cheerfulness; mirth; merriment; gayety; joyousness; exhilaration.

HILARY, a. *hĭl'a-rĭ* [from *St. Hilary*]: in *England*, applied to a legal term (Jan. 11–31) during which the courts of law sit at Westminster in banc; commencing near the time of St. Hilary's day, Jan. 14.

HILARY, *hĭl'a-rĭ* (or HILARIUS, *hī-lā'rĭ-ŭs*): Bishop of Poitiers (Pictavium), eminent doctor of the church: b. at Lemonum (Poitiers), of pagan parents, about the end of the 3d c.; d. 368, Jan. 13. Though not among the most voluminous of the Latin Fathers, yet, from the nature of the subjects on which he wrote, chiefly connected with the Arian controversy, Hilary occupies an important place in the patristic literature of the Western Church. His conversion to Christianity was mainly the result of his own

study of the prophecies, and did not take place till he was advanced in life. About 350 he was elected bishop of his native city, and immediately rose to the first place in the animated contest of parties in the Arian controversy. Having provoked the displeasure of the court party, he was imprisoned, and sent into exile in Phrygia; but he appears again in the council of Seleucia 359, and soon afterward was permitted to resume his see, where he died. The Rom. Cath. church holds his day, Jan. 14. His most important work is that on the Trinity, but his three addresses to Emperor Constantius, by their vehemence, and by the boldness of their language, have most attracted the notice of critics. Hilary's theological writings are valuable especially for the history of the Arian party, particularly for the doctrinal variations of that sect, and its successive phases between the council of Nice and the first council of Constantinople. He has been called the Athanasius of the West. The best edition of the works of St. Hilary is that of the Benedictine Dom. Constant (Paris 1693), or the reprint of it with additional matter by Maffei (Verona 1730).

HIL'ARY (or HILA'RIUS) OF ARLES, SAINT: Bishop of Arles: abt. 403–449. He was educated at the celebrated monastic school of Lerins, and made bishop of his native city 429. As metropolitan of Arles, he presided at several synods, especially at Orange 441, the proceedings of which involved him in a serious controversy with the pope, Leo the Great. A deposed bishop, named Chelidonius, having carried an appeal to Rome, a council was summoned by Pope Leo, at which Hilary was present, and in which the condemnation of Chelidonius, as well as that of another bishop, Projectus, was reversed. Hilary, however, refused to submit to the decision, and soon quitted Rome—a proceeding which drew on him a very severe animadversion. He did not question the authority in itself, but he maintained that it was uncanonically exercised. In the end, however, he sought a reconciliation with Pope Leo, and the dispute was brought to an amicable termination. He died at Arles.

HILDA, *hĭl'da* (or HILD), SAINT: 614–680; b. England: abbess. She was a member of the royal house of Northumbria, and grandniece of King Edwin; was baptized when 14 years old, settled in the monastery of Chelles, France, on the pagan reaction after Edwin's death, was recalled to England by Bp. Aidan, consecrated a nun 647 became abbess of Hartlepool 649, founded the famous monastery at Streaneshalch, now Whitby, in Yorkshire, 658; and ruled her community of monks and nuns with rare skill and to noble purpose till her death. She was a woman of exalted piety, successful in converting pagans, and received in her institution many eminent men, including St. John of Beverley, Cædmon the Saxon poet, Hedda, and Wilfrid. Several churches in England have received her name, and her feast is observed Nov. 18.

HIL'DEBRAND. See GREGORY VII.

HILDESHEIM, *hĭl'dĕs-hīm:* old town of Hanover, cap. of a Prussian administrative division, on the river Innerste, in a pleasant valley surrounded by hills, 24 m. s.e. of Hanover. It is a very quiet town, with very old houses, the upper stories of which are furnished with balconies. It has been a bishop's seat since 822, and its cathedral, dating from the beginning of the 11th c., has bronze gates (date, 1015) 16 ft, high, covered with bas-reliefs. There are in the cathedral beautiful paintings on glass, and many art and other treasures. The church of St. Godehard, considered a master-piece of architecture, dates from 1133 (restored 1852), and is surmounted with three pyramidal towers. St. Michael's Church, nearly an unaltered basilica, dates from 1022 and 1186. In 1868, Oct., some soldiers, digging on the Galgenberg, close by Hildesheim, discovered at a depth of 9 ft. about 60 silver vessels, belonging apparently to the best period of Roman art. Pop. 43,000.

HILDING, n. *hĭl'dĭng* [prov. Eng. *hilderling,* or *hinderling*—from *hinder,* behind, and *ling,* little]: in *OE.,* a menial or base creature; a cowardly paltry fellow; a word applied to both sexes: ADJ. base and cowardly; sorry paltry.

HILDRETH, *hĭl'drĕth,* RICHARD: 1807, June 22—1865, July 11, b. Deerfield, Mass.: author. He graduated at Harvard College 1826, was admitted to the bar in Boston 1830, practiced two years, and then became founder and co-editor of the Boston *Atlas.* He was in Fla. for his health 1834–36; Washington correspondent of the *Atlas* 1836–39; edited *The Guiana Chronicle* and *The Royal Gazette* in the interest of the British govt.'s plan of abolishing slavery, in Demarara, British Guiana, 1840-43; wrote for the New York *Tribune* and Appleton's *American Cyclopædia;* was appointed U. S. consul at Trieste 1861; and died in Florence, Italy. His chief work was a *History of the United States,* 6 vols. (New York 1849–56); beside which he published *The Slave, or Memoir of Archie Moore* (1836), republished as *The White Slave* (1852); *Theory of Morals* (1844); *Theory of Politics* (1853); *Despotism in America* (1854); *Japan as it Was and Is* (1855); *History of Banks* (1857); and *Atrocious Judges,* based on Lord Campbell's *Lives of the Chief Justices of England* (1857).

HILE, n. *hĭl.* See HILUM.

HILGARD, *hĭl'gârd,* EUGENE WOLDEMAR, German-American chemist and geologist: b. Zweibrücken, Bavaria 1833, Jan. 5. He came to the United States in 1836, returned to Europe for purposes of study and was graduated (PH. D.) at Heidelberg, 1853. In 1858 he became State geologist of Mississippi, in 1873 was appointed professor of geology and natural history in the University of Michigan, and in 1875 was made professor of agricultural chemistry and director of the agricultural experiment station in the University of California. He received the Liebig medal from the Munich academy of sciences in

A. P. HILL MONUMENT, RICHMOND, VA.

1894, and his investigations into the chemistry and physics of soils have done much to promote agricultural science.

HILGARD, JULIUS ERASMUS: scientist: b. Zweibrücken, Germany, 1825, Jan. 7; d. 1891, May 8: son of Theodore Erasmus Hilgard, lawyer and author. He came to the United States with his father and settled in Belleville, Ill., 1835, studied civil engineering in Philadelphia 1843–45, became an asst. on the U. S. coast survey 1845, asst. in charge of the bureau at Washington 1862, and succeeded Prof. Alexander D. Bache as supt. 1881, holding the office till 1885. He had charge of the construction of standard weights and measures, was appointed a member of the National Acad. of Sciences 1863, member of the international metric commission and elected to its permanent committee 1872, and pres, of the American Assoc. for the Adv. of Science 1874.

HILL, n. *hĭl* [O.Dut. *hil*, or *hille;* Dut. *heuvel;* Ger. *hügel*, a hill: Low Ger. *hull*, a mound: Fris. *hovel*, a hunch in the back]: a natural elevation of the land less in height than a mountain. HILLSIDE, n. the side of a hill. HILL'Y, a. -ĭ, abounding with hills. HILLOCK, n. *hĭl'ŏk*, a small hill.

HILL, n. *hĭl* [see HULL]: in *Scot.*, the outer covering or shell, as of the pod of the pea or bean, the skin of a gooseberry, and the like: V. to take off the outer covering; to hull. HILL'ING, imp. HILLED, pp. *hĭld.*

HILL, *hĭl*, AMBROSE POWELL: 1825, Nov. 9—1865, Apr. 2; b. Culpeper co., Va.: soldier. He graduated at the U. S. Milit. Acad. and was assigned to the artillery 1847, served through the Mexican and Seminole Indian wars, was on coast survey duty 1855–60, on leave of absence 1860, Oct.—1861, Mar., resigned his commission in the army, and on the secession of Virginia, was appointed col. 13th Va. vols. in the Confederate army. He was promoted brig.-gen. for services at the first Bull Run, maj.gen. for Williamsburg, was div. commander in the peninsula, present at the battles of Cedar Mountain, the second Bull Run, and Chantilly; captured Harper's Ferry 1862, Sep.; was at Antietam, Fredericksburg, Chancellorsville; commanded the corps after 'Stonewall' Jackson's death, was promoted lieut.gen. for Chancellorsville, and killed in the final assault on the Confederate lines before Petersburg.

HILL, BENJAMIN HARVEY: 1823, Sep. 14—1882, Aug. 19; b. Jasper co., Ga.: statesman. He graduated at the Univ. of Ga. 1844, and was admitted to the bar and began practicing in La Grange, Ga., the following year. From the outset of a legal career in which he early achieved marked distinction, he became active in state politics as an adherent of the whig party. and gained more than a local renown as an orator. He was elected to the legislature 1851; was a Fillmore presidential elector for his state at large 1856; and went to the state senate as a pronounced unionist 1859. In the presidential election 1860 he was on the Bell and Everett electoral ticket. The following

year he was elected to the state secession convention and made a powerful speech against the secession ordinance, but subsequently voted for it. During the civil war he served in the Confederate senate, and after its close was confined for a short time in Fort Lafayette. In the reconstruction days he opposed the policy of Pres. Johnson and the acts of congress, and in 1872 warmly supported the candidacy of Horace Greely for the presidency. Three years afterward he was elected to congress to fill a vacancy, and there greatly enhanced his fame by a noteworthy speech on the amnesty bill. He was re-elected for a full term 1876, and before its close he was chosen to the United States senate, where he served till his death. In the house he supported the electoral commission bill, and in the senate he served on the committees on foreign relations, privileges and elections, and revolutionary claims. In view of his eminent abilities and large influence, his death was considered most untimely by public men of all parties. A life-size statue of Hill in white marble, on the handsomest spot in Atlanta, perpetuates the form and features of one of the most distinguished sons of Georgia.

HILL, Daniel Harvey: 1821, July 12—1889, Sep. 29; b. Hill's Iron Works, York district, S. C.: military officer. He graduated at the United States Military Academy 1842; was on the Maine boundary during the frontier dispute with Great Britain; served through the Mexican war, distinguishing himself at Chepultepec, Contreras, and Churubusco; resigned from the army and was engaged in educational work in Va., N. C., and S. C., till the beginning of the civil war; and became col. of a N. C. regt. and won the battle of Big Bethel 1861. In 1862 he became a maj.-gen. in the Confederate service, and was conspicuous on the Peninsula, in the first Md. campaign, the battle of Fredericksburg, and the Chancellorsville campaign. He was promoted lieut.gen. 1863, July 11, and surrendered with Gen. Joseph E. Johnson 1865, April. After the war he was pres. of the Univ. of Ark. and of the Ga. Military and Agricultural College, and engaged in literary work.

HILL, David Bennett: lawyer: b. Havana, Schuyler co., N. Y., 1843, Aug. 29. He received a common-school and academical education, removed to Elmira 1863, studied law, and was admitted to the bar there 1864. The same year he was appointed city attorney and entered political life, was a member of the legislature 1869-71; pres. of the democratic state conventions 1877, 81; delegate to the national conventions 1876, 81; mayor of Elmira 1882; the same year elected lieut.gov. of N. Y. on the ticket with Grover Cleveland; became gov. on the resignation of Pres.-elect Cleveland 1885, Jan. 6; served to the end of the term, and was elected gov. 1885, and re-elected 1888; and was elected United States senator for the term ending Mar. 4, 1897, succeeding William M. Evarts 1891. For a num- of years his antagonism of President Cleveland was most pronounced, but amicable relations appeared to be restored 1894, and Hill supported the president's views in a notable

speech against the income-tax clause of the compromise tariff bill in the senate June 21. 1894, Sep. 26, he was again chosen democratic candidate for gov., but was defeated in November by 156,108 plurality. In the 53d congress (1893, Mar. 4—1895, Mar. 4), he was chairman of the committee on immigration, and a member of those on fisheries, judiciary, post-offices and post-roads, territories, and the organization, conduct, and expenditures of the executive departments. Hill was elected president of the New York Bar Assoc. 1886, and served two terms. He has been mentioned frequently for the democratic presidential nomination, receiving 115 votes in the convention of 1892.

HILL, David Jayne, a.m., ll.d.: educator: b. Plainfield, N. J., 1850, June 10. He graduated at Lewisburg (now Bucknell) Univ. 1874, and became prof. of rhetoric there 1877 and pres. 1879, and pres. of the Univ. of Rochester 1888, resigning the last office 1895, Nov. 20; was appointed 1st assistant secretary of state, 1898; Minister to Switzerland, 1903, to the Netherlands 1905 and to Germany in 1907. Among other works he published *Elements of Rhetoric and Composition* (1879); *Principles and Fallacies of Socialism* (1885); *The Elements of Psychology* (1887); *The Social Influence of Christianity* (Boston 1887); *Genetic Philosophy* (1893); *International Justice; A Primer of Finance; The Conception and Realization of Neutrality* (1902); *The Life and Work of Hugo Grotius* (1902); *The Contemporary Development of Diplomacy* (1904); *A History of Diplomacy in the International Development of Europe* (1905); etc.

HILL, Frank Alpine, American educator: b. Biddeford, Maine, 1841, Oct 12; d Brookline, Mass., 1903, Sep. 12. He had long been prominent among New England educators, and after being head-master of high schools in Milford, Chelsea, and Cambridge, Mass., became secretary of the Massachusetts State Board of Education in 1894. He was a trustee of the Massachusetts Institute of Technology, of the State Agricultural College at Amherst, and of the Boston Museum of Fine Arts, as well as a commissioner of the State School Fund.

HILL, Frank Pierce, American librarian: b. Concord, N. H., 1855, Aug. 22. He was graduated from Dartmouth in 1876. In 1881 he became librarian of the Lowell public library, and in 1885 he organized the first free public library in New Jersey at Paterson. He also organized the Salem public library, and the Newark library in 1889. At Newark a new building was erected under his administration and the library brought to a high degree of efficiency so that it is recognized as one of the model public libraries. In 1901 he was appointed chief librarian of Brooklyn, under the new system established upon the receipt of Mr. Carnegie's gift.

HILL, Frederic Stanhope, American sailor and author: b. Boston, 1829, Aug. 24. He went to sea when a boy, and during the civil war was an officer in the United States

navy. He was with Farragut at the capture of New Orleans and Vicksburg, and was also in command on the Texas coast and in the Mississippi squadron. He has written: *Twenty Years at Sea* (1896); *Story of the Lucky Little Enterprise; Twenty-six Historic Ships* (1903); and has been editor of the Cambridge *Tribune*.

HILL, George Birbeck, English educator and author: b. Tottenham, Middlesex, 1835, June 7; d. Hampstead, London, 1903, Feb. 24. He was a nephew of Sir Rowland Hill (q.v.), was educated at Oxford, and was head-master of Bruce Castle school 1859–76. After the latter date he devoted his attention to literature and was well known in the United States through his *Harvard College, by an Oxonian* (1894). Other works by him are: *Talks about Autographs* (1896); *Dr. Johnson: his Friends and his Critics* (1878); *Life of Sir Rowland Hill* (1880); *Footsteps of Dr. Johnson in Scotland* (1890); *Memoirs of the Life of Edward Gibbon* (1900).

HILL, George William, ph.d., ll.d.: b. Nyack, N. Y., 1838, Mar. 3. astronomer and mathematician. He graduated at Rutgers College, N. J., 1859, and was an assistant in the office of *The Nautical Almanac* at Washington, D. C., from his graduation till 1892, when he resigned to pursue the original researches which brought him distinction. The Royal Astronomical Soc. of London awarded him its gold medal 1887 for his labors on the mathematical theories of celestial motions, and the Univ. of Cambridge gave him the degree ll.d. 1892.

HILL, James J., American capitalist: b. near Guelph, Ont., 1838, Sep. 16. At 18 in the village of St. Paul, Minn., he became check-clerk and caretaker of freight at the steamboat landing. At that time there was not a mile of railroad in the state. In 1862 the first 10 miles of railroad was finished from the levee in St. Paul to the riverside in St. Anthony, and known as the St. Paul and Pacific railroad, of which Hill later became the agent. After the civil war, Hill clearly discerned the great resources and possibilities of the Red River country—Western Minnesota and Eastern Dakota. He went East, contracted for his boilers and machinery, and on the bank of the river built a flat-bottomed steamer called The Selkirk, which in the summer of 1870 began to run between Winnipeg and the head of navigation, to rival the line operated by the Hudson Bay company. The same year, 1876, Hill consolidated his transportation interests with those of the Hudson Bay Company, forming the Red River Transportation Company. The St. Paul and Pacific railroad now reached the western boundary of the state at Breckenridge. For several years the St. Paul and Pacific system of railroads, consisting of 437 miles of completed track, was in poor condition. The stockholders, mostly Holland capitalists, were weary with delay and misfortune. Because of his faith in the future of the region Hill formed a syndicate of five persons which soon gained possession of the road,

and in June 1879, the system was consolidated into a single ownership as the St. Paul, Minneapolis and Manitoba railroad company. In 1880 the road was extended to the Pacific coast, traversing vast tracts of land without human habitation. The track was well laid, but the stations were often only freight cars, remote from one another, and from other human settlements. The road is now known as the Great Northern. Coal fields were discovered, a branch road carried their product for the use of the main line and settlements formed for preparing the lumber for shipment. To ship valuable lumber eastward was an excellent plan; but to send empty cars after it was out of the question; and Hill conceived the idea of shipping grain for the Japanese steamers to carry to the Orient. An agent was sent to China and Japan to find out what the price of wheat must be to compete with rice, and the result was that the Japanese Navigation Company, the third largest steamship company in the world, began to carry large shipments of grain to China and Japan. Large docks for these steamers were built at Seattle, Wash., the western terminus of the road. The original 437 miles of completed road of which Hill took charge as manager, developed into the Great Northern system of over 6,000 miles. In 1883 he became president of the company. The road extends from Puget Sound to St. Paul, or during the season of navigation to Duluth and Superior, where it connects for Buffalo with its own steamers. A fleet of six freight vessels are added to these. The grain ships moving through the 'Soo' give that canal rank over the Suez in point of tonnage.

In developing this scheme the plan increased enormously in the process. Besides laying the foundation of a great fortune, it opened a very rich and vast new country, reached out to new markets for many American products, and brought benefit to great numbers of people. All along the line of the road Hill encouraged the most diversified and productive farming, and introduced new methods and labor-saving devices. In 1907 he retired from business activity.

HILL, Octavia, English social reformer: b. about 1838. She began work among the London poor under F. D. Maurice (q.v.); and in 1864, supported by Ruskin, began her great work of improving the homes of workingmen in the slums of London. Her methods were based upon the principle of teaching the people to help themselves, by inculcating in them right notions of cleanliness, order, and self-respect. Her efforts have been crowned with great success; the houses which have been improved yield a good percentage on the money spent in effecting the improvements; and through her hundreds have been helped to lead more comfortable and better lives. She has written *Homes of the London Poor* (1875); *Our Common Land and other Essays* (1878).

HILL, Robert Thomas, American geologist: b. Nashville, Tenn., 1858, Aug. 11. He was graduated from Cornell University in 1886, and was immediately given a

position on the United States Geological survey. He was also a lecturer in the school of economics at the University of Michigan, and professor of geology at the University of Texas for two years, which position he resigned to return to the United States Geological survey. He has been engaged in geological and geographical explorations in the Southwestern States of Mexico, Central America and the West Indies. His work in the two last mentioned localities has been the investigation of the origin of the land forms, and the problem of the union of the continents. Among his most valuable contributions to geological science have been the proof of the existence of the lower cretaceous formation in the United States and the announcement of the possibility of artesian wells in Texas. In May 1902 he was sent by the National Geographical Society at the head of the expedition to investigate the volcanic eruption of Mount Pelée in Martinique. His publications include *On Occurrence of Artesian and Other Underground Waters in Texas* (1892); *Cuba and Porto Rico with other Islands of the West Indies* (1898): and numerous contributions to the bulletins of the geological survey and periodicals.

HILL, Rowland: 1744, Aug. 13—1833, April 11; b. Hawkstone, England: clergyman. He was a son of Sir Richard Hill; was educated at Eton and at St. John's, Cambridge, England; became acquainted with George Whitefield and preached in prisons and private houses while at college; was prevented from joining the Methodists by his family; took orders in the Church of England though six bps. refused to ordain him on account of his Calvinistic views; and was appointed to the parish of Kingston 1773. After Whitefield's death his followers made several proposals to Hill to become his successor, but he declined all, and retained his place in the Church of England till his death, though following many of the Methodist usages. He preached in the open air every day in the week to large congregations, speaking extempore, and indulging abundantly in anecdotes, wit, and quaint maxims. The death of his father brought him considerable property 1780, and he built Surrey Chapel, on Blackfriar's road, London, for his own use, laying the first stone 1782, and holding his first service 1783, June 8. For 50 years he preached here to crowded audiences in the winter months, and made 'gospel-tours' through England, Scotland, Ireland, and Wales, in summer. He had a voice of great power, and exerted great influence over his audiences. He seemed to have little time for authorship, but published several works, of which his *Village Dialogues* (1801, 34th ed. 1824) is best known.

HILL, Sir Rowland, K.C.B., D.C.L.: English postal reformer: 1795, Dec. 3—1879, Aug. 27; b. Kidderminster. He was named after Rowland Hill, the preacher. His father conducted a school near Birmingham, known in connection with the 'Hazelwood system of education' (afterward removed to Bruce Castle, Tottenham), and in which

Hill was engaged as a teacher until 1833. He there joined an association which obtained an act for establishing the colony of South Australia, with the design of reducing to practice Gibbon Wakefield's scheme of colonization. Hill became sec. to the royal commissioners, who at first managed the affairs of S. Australia. He was also a member of the committee of the Soc. for Diffusion of Useful Knowledge. The high rate of postage had for many years engaged his attention, and 1837 he published a pamphlet recommending a low and uniform rate of postage throughout the British Isles. Petitions were poured into the house of commons in favor of Hill's plan, and in 1837 the house appointed a committee to investigate the merits of penny-postage. In 1840, the principle of a uniform rate was adopted, and an experimental charge of 4d. per letter was levied. This was soon followed by the present uniform penny-rate. Hill was placed in the treasury, and was working out his measure when the tory government succeeded to power, and dismissed him. A subscription was started to reward a public benefactor, as well as to mark the public sense of his dismissal, and the sum of £15,000 was presented to Hill. In 1846, when the whigs returned to office, Hill was appointed sec. to the post-master general. In 1854, he became sec. to the post-office, an appointment which he held till failing health compelled him to resign 1864. His full salary of £2,000 a year was awarded him for life, and he also received a parliamentary grant of £20,000. He was made K.C.B. 1860, and D.C.L. (Oxon) 1864 (see POST-OFFICE). The money-order office is one of the offshoots of penny-postage; and the system of the post-office savings-banks was organized in 1861 by Hill with his usual administrative ability. He was buried in WestminsterAbbey.—His eldest brother MATTHEW DAVENPORT HILL (1792–1872), long the recorder of Birmingham, distinguished himself by his labors for education, and the reformation of criminals.—Another brother, FREDERIC HILL, was the first to propound and enforce those humane principles upon which modern prison discipline is founded; and his work, *On Crime*, is a standard authority for legislators. See *The Life of Sir Rowland Hill* (2 vols. 1880).

HILL, Viscount (ROWLAND HILL), G.C.B.: British general and commander-in-chief: 1772, Aug. 11—1842, Dec. 10; b. Prees, Shropshire; of an ancient and distinguished family, second son of Sir John Hill, Bart., of Hawkstone; and nephew of Rowland Hill, preacher. He entered the army at the age of 15, and obtained a captaincy before the age of 20. He took part in the disastrous campaign in which Sir John Moore lost his life, and served in the campaigns of 1809, 10, 11, under the Duke of Wellington, showing conspicuous gallantry, as well as great talents as a commander. In 1809 he was made lieut.general. In the Peninsular engagements, he was usually intrusted with the most important duties next to those which developed upon the Duke of Wellington; and when the army returned home, the fame of Hill was second only to that of the great

commander. He was created Baron Hill of Almarez and Hawkstone, received a parliamentary grant of £2,000 a year; and both title and annuity were granted to his nephew in remainder. He commanded a division at Waterloo, and remained with the army of occupation, as second in command, until it evacuated the French Territory. He succeeded the Duke of Wellington 1828 as commander-in-chief of the army. Hill united great daring with great sagacity and coolness of judgment; and his unfailing regard for the moral and bodily welfare of his soldiers, made him beloved by them all. In 1842, his health declined, and the Duke of Wellington again took command of the army. After his resignation Hill was created a viscount. He died unmarried at Hardwicke Grange, county of Salop, and was succeeded in his titles and estates by his nephew, Sir R. Hill, Bart.

HILL, THOMAS, D.D., LL.D.: Unit. minister: b. New Brunswick, N. J., 1818, Jan 7; d. 1891, Nov. 21. He graduated at Harvard College 1843, and the Cambridge Divinity School 1845; was pastor of a Unit. church in Waltham, Mass., 1845–59; pres. of Antioch College, O., and afterward pastor of the Church of the Redeemer, Cincinnati, 1859–62; pres. of Harvard College 1862–68; member of the Mass. legislature 1871; accompanied Prof. Agassiz on his S. American expedition; and on his return became pastor of the Unit. church in Portland, Me. He belonged to the strongly evangelical wing of the Unitarians. He was a mathematician of rare ability, and made valuable discoveries in the law of curves. His publications include *Elementary Treatise on Arithmetic* (1845); *Geometry and Faith* (1849, 74); *Treatise on Curves* (1850); *First Lessons in Geometry* (1855); *Liberal Education* (1855); *The True Order of Studies* and *Jesus the Interpreter of Nature* (1859); *The Natural Sources of Theology* (1875); and *Practical Arithmetic* (1881). He received the degree D.D. from Harvard College 1860, and LL.D. from Yale College 1863.

HILLARD, *hĭl'ard*, GEORGE STILLMAN, LL.D.: 1808, Sep. 22—1879, Jan. 21; b. Machias, Me.: lawyer. He graduated at Harvard College 1828, was admitted to the bar in Boston 1833; became an editor of the *Christian Register* (Unit.) the same year, was subsequently associated with Charles Sumner in editing *The Jurist;* was state senator 1850, member of state constitutional convention 1853, city solicitor 1854-56, and U. S. dist. atty. for Mass. 1866–70. He delivered and published numerous orations and addresses, was author of several memoirs privately published, brought out a *Memorial of Daniel Webster* and *Six Months in Italy* (1853); a series of *Readers* and *Selections from the Works of Walter Savage Landor* (1856); *Life and Campaigns of George B. McClellan* (1864); *Political Duties of the Educated Classes* (1866); and, with Mrs. Ticknor, *Life of George Ticknor* (1873). He received the degree LL.D. from Trinity College 1857.

HILLEL, *hĭl'lĕl* (sometimes HILLEL HAZAKEN, i.e. Hillel the Elder): distinguished Jewish rabbi, concerning whom

all our information is derived from the Talmud. Its highly eulogistic account while exaggerated and, in some particulars, contrary to established facts, is yet by the most competent critics accepted as to its general outline. According to it Hillel was born at Babylon (of parents who though poor were descendants of King David) about B.C. 75; and died a few years after the beginning of the Christian era. Thirsting for knowledge, he went in his youth to Jerusalem, and, supporting himself by daily labor, paid half of his scant wages for admission in the evening to the famous school of Shemiah and Abtalion. Once, in winter and on the eve of the Sabbath, having no money and being refused admission by the janitor he climbed up to the window of the classroom, where he was first benumbed with cold and then half buried in a deep fall of snow. In the morning the teachers found the window darkened by a motionless human form enveloped in snow. They bathed him, rubbed him with oil, and placed him before the fire, saying 'Surely his deliverance excuses the violation of the Sabbath which it compels.' After that, being welcomed freely to the school, he made great attainments in learning, was honored by Herod, and became both the founder of a school and the head of a family which included in it eminent teachers like himself—Simon, Gamaliel, and a second Hillel. Shammai, who perhaps was one of his pupils, became the head of a rival, and, at times, bitterly hostile school. The disputes between them were, generally, about extremely unimportant things. Yet, comparatively, Hillel was like a star in a dark sky. Even in the midst of trivial casuistry his decisions often leaned to the liberal and spiritual side, and gave rise to the proverbial formula, 'Be gentle, as Hillel; not harsh, as Shammai.' Of similar character were several sayings attributed to himself: 'Be disciples of Aaron who pursued peace, loved all men and attracted them toward the law.' 'What thou wouldst not for thyself, do not to thy neighbor. This is the whole law and its application is, Go and do this.' 'The more meat a man has, the more food is there for worms; the more wealth the more care: but the more law, the more life; the more righteousness, the more peace.'

HILL-FOLK, n. *hĭl'fōk;* in *chh. hist.*, name sometimes given to the Cameronians in Scotland, who were driven to hold their 'conventicles' secretly among the hills, their doing so anywhere being held illegal. In *Scand. myth.*, a class of beings intermediate between elves and human beings, inhabiting caves and small hills.

HILLIS, *hĭl'lĭs*, NEWELL DWIGHT: an American clergyman; b. in Magnolia, Ia., 1858, Sep. 2; was educated at Iowa College, Lake Forest University, and McCormick Theological Seminary; entered the Presbyterian ministry; held pastorates in Peoria, Evanston, and Chicago, Ill., till 1899, when he removed to Brooklyn to become pastor of Plymouth Church. His published works include *The Investment of Influence; A Man's Value to Society; How the Inner Light Failed; Foretokens of Im-*

mortality; Great Books as Life Teachers; The Influence of Christ in Modern Life; Quest of Happiness (1902); *Success Through Self-help* (1903); *Building a Working Faith* (1903); *The Quest of John Chapman* (1904); etc.

HILLSBORO, Ill., city, county seat of Montgomery county; on the Cleveland. C., C. & St. L. railroad; about 45 miles south by west of Springfield, and 52 miles northwest of East St Louis. Its chief manufactures are flour, furniture, woolen goods, carriages and wagons, and dairy products. There is a coal-mine nearby. It is the commercial center of an agricultural section of the state. Pop. 2,100.

HILLSBORO, Ohio, village, county seat of Highland county; on the Norfolk & W. and the Baltimore & O. S. R.R.'s; about 60 miles southwest of Columbus and 50 miles east by north of Cincinnati. It is in an agricultural and stock-raising region. The chief manufactures are furniture, foundry products, flour, lumber, dairy products, and cigars. It is the trade centre for a large part of Highland county. It has a public library containing about 8,000 volumes, and a number of fine public and private buildings. The city owns and operates the waterworks. Pop. 4,600.

HILLSBORO: city of Texas, seat of Hill co.; on the Missouri, Kansas and Texas, and the St. Louis Southwestern r.r.s., 38 m. n. of Waco. It has farming, stock-raising, and manufacturing interests, including cotton-seed oil, cotton goods, men's clothing, hosiery, farming implements, flour and lumber, and carries on an active export trade. Hillsboro has municipal water-works. Pop. (1910) 6,115.

HILLSDALE: city of Mich., seat of Hillsdale co.; on the St. Joseph river, and on the Lake Shore and Mich. Southern R.R., 177 m. e. of Chicago. It is the seat of Hillsdale College (Freewill Bapt.), founded at Spring Arbor 1844, removed to Hillsdale 1855, and has many fine buildings, a public park, and municipal water-works and electric-lighting plant. A farming trade centre. Hillsdale also manufactures flour, fur clothing, door and window screens, furniture, furnaces, wagon wheels, etc. Pop. (1910) 5,001.

HILL-TRIBES, n. *hĭl'trĭbz:* in *ethnol.*, remnants of the early tribes found among the inhabitants of hills. As a rule, there are such remnants of the tribes which possessed the plains before their present occupants seized on them. Thus, in the British Isles, the Gaelic speaking population of the Highlands once occupied also the Lowlands of Scotland, and the inhabitants of the Welsh hills the plains of England. The term hill-tribes is now used chiefly of the Indian aborigines in the Himalayas, the Vindhya, the Western Ghauts, the Neilgherry Hills, etc. They are divided into many tribes, as Gonds, Khoonds, Bheels, etc., are mostly Turanian, and were in India before the Brahmans had invaded the land, have a primitive faith, in some

cases attended by human sacrifice, speak truth, are brave, but rude and uncivilized. They number several millions. Many of them are becoming Christians in belief.

HILO, *hē'lō:* seaport of Hawaii, on Byron (Waiakea) Bay on the e. coast; second town in importance in the kingdom, having a spacious harbor secure the greater part of the year, and great natural beauty. It has four churches, Prot. and Rom. Cath. for the Hawaiians, a foreign church and a Bethel for seamen. Rains are frequent and heavy, and supply 50 streams in the district that empty into the sea within a coast limit of 25 m. Pop. 20,000.

HILPRECHT, *hīl'prĕcht*, HERMAN VOLRATH: an American educator: b. in Hohenerxleben, Germany, 1859, July 28; was graduated at the Ducal Gymnasium, Bernburg, Germany, 1880; afterward studied theology, philology, and law at the University of Leipzig; and became professor of Assyrian and Comparative Semitic philology at the University of Pennsylvania, 1886. He is a leading authority in cuneiform palæography; and curator of the Semitic section of the museum of the University of Pennsylvania, which contains over 27,000 original cuneiform documents; was the scientific director and Assyriologist of the University of Pennsylvania expedition to Nippur, Babylonia, 1888–99; and made frequent scientific explorations in Asia Minor and Syria. He has published *Old Babylonian Inscriptions, Chiefly from Nippur; History of the Babylonian Expedition of the University of Pennsylvania, to Nippur; Recent Researches in Bible Lands; Explorations in Bible Lands during the* 19*th Century* (1903); *Die Ausgrabungen im Bêl-Tempel zu Nippur* (1903); *Ausgrabungen im Assyrien und Babylonien* (1904); etc.

HILT, n. *hĭlt* [Dut. *hilte*, the hilt of a sword—from *holte*, a cavity: Icel. *hialt*, the knob at each end of a handle]: the handle of anything, chiefly a sword. HILT'ED, a. having a hilt; in *her.*, indicating the tincture of the handle of a sword.

HIM, pron. *hĭm* [AS. *hine*, him (see HE)]: the obj. case of *he; his*, poss. HIMSELF, masc. [*him*, and *self*]: a reciprocal pron., joined to a noun or pronoun to render it more emphatic. HERSELF, fem. THEMSELVES, plu. com. gend. BY HIMSELF, alone; unassisted.

HIMALAYA, *hĭm-â'la-ya* or *hĭm-a-lā'ya* ['the abode of snow,' from Sanskrit, *hima*, snow, and *âlaya*, abode]: in south central Asia; highest and most stupendous mountain system on the globe. It is not, as sometimes represented, a single chain, but a range of rugged snowy peaks extending from the high table-land of Tibet, and separated by deep gorges, the outlets of the streams originating in the melted snow and ice of the interior. The mass of the Himalaya proper extends from the great bend of the Indus in the w., to the junction of the Sanpu with the Brahmaputra in the e., or long. 73° 23′—95° 40′ e., nearly 1,500 m.; average breadth abt. 150 m. The mean eleva-

tion of the range is 16,000 to 18,000 ft., but 45 of its peaks are now known to exceed 23,000 ft. in height. Of these there are in Kumaon, Nanda Devi, 25,749 ft.; in Nepaul, Dhawalagiri, 26,826 ft.; Mount Everest, 29,002 ft. (highest known point on the globe); and Kunchinjinga, 28,156 ft.; in Bhotan, Chumalari is 23,946 ft. above the sea. The s. surface of the Himalaya comprises three distinct regions—first, adjoining the plains of Hindustan, the *Tarai*, a grass-covered marshy plain; next, the great belt of *Saul Wood*, stretching along a great part of the range; and beyond it the *Dhuns*, a belt of detritus, extending to the foot of the true mountains.

Snow falls at rare intervals in the mountains as low as 2,500 ft., but at 6,000 ft. snow falls regularly every winter. The limit of perennial snow in the Himalaya is 16,200 ft. on the s., and 17,400 ft. on the n. side; an anomaly probably owing to the dry atmosphere of Tibet, and the small quantity of rain and snow that falls there. The high range of the Himalaya forms a vast screen which intercepts and condenses nearly all the moisture carried by the winds from the Indian Ocean, and deposits it on the southern face of the mountains; hence at Chirra Punji, 4,200 ft. above the sea, as much as 600 inches of rain has been known to fall in one year. Glaciers are found in every part of the range above the snow line, one of these, that of Deotal in Gurhwal, is 17,945 ft. above the sea. The mean height of the passes in the Himalaya is 17,800 ft., the highest known is Ibi-Gamin Pass into Gurhwal, 20,457 ft., and the highest used for traffic is the Parang Pass in Spiti, 18,500 ft. above the sea. All the passes above 16,000 ft. are closed with snow from Nov. till May. Trees and cultivated grains attain their highest limits in the mountains at 11,800 ft. and shrubs at 15,200 ft. above the sea. The tea-plant can be cultivated along the entire s. face of the Himalaya to an elevation of 5,000 ft., but the best is produced 2,000 to 3,000 ft. above the sea. Tigers and apes are found at an elevation of 11,000 ft., and the leopard at 13,000 ft., while the dog follows the herds over passes 18,000 ft. high. Snakes are found at an elevation of 15,000 ft., but the highest limit of the mosquito is 18,000 ft. above the sea. The geological structure of the Himalayas consists of crystalline rocks, with granite, gneiss, and a schistose formation comprising micaceous, chloritic, and talcose schists. Earthquakes are frequent in the central range. About the meridian of 82° e., near the Mansarowar Lake, a great transverse range, which further n. is called the Giang-ri Mountains, abuts against the Himalaya from Tibet. This ridge forms the watershed between the Sanpu (afterward the Brahmaputra) on the e., and the Indus and Ganges on the west. These vast river systems, with their magnificent tributaries, derive their chief supplies from the melting of the snows in the Himalaya and consequently are in flood at the hottest season of the year when the moisture which they bring is most needed.

On account of the majestic height of this mountain-range, and the apparent impossibility of reaching its sum-

mit, the imagination of the ancient Hindus invested it with the most mysterious properties, and connected it with the history of some of their deities. In the Purânas, the Himalaya is placed s. of the fabulous mountain Meru, which stands in the centre of the world (see MERU), and described as the king of the mountains, who was inaugurated as such when Prithu was installed in the government of the earth. As the abode of Siva, he is the goal of penitent pilgrims, who repair to his summit in order to win the favors of this terrific god. His wife was Menâ, whom the Pitris or demi-gods Vairâjas engendered by the mere power of their thought.

HIM'ERA. See TERMINI.

HIMMA'LEH. See HIMALAYA.

HIMYARIC, a. *hĭm-yar'ĭk*, or HIMYARITIC, a. *hĭm'yăr-ĭt'ĭk* [*Himyar*, an anc. king of Yemen, Arabia]: pertaining to the primitive people, or their language, of s. Arabia—comprising all the races from the Euphrates to Abyssinia who trace their origin to the mythical Himyar nearly 2500 years B.C. The Himyaric inscriptions (some of which are in the British Museum, dating prob. from the later Himyarite kings B.C. 100–A.D. 500) exhibit the oldest known forms of the language as spoken in s. Arabia: see ARABIAN LANGUAGE AND LITERATURE. HIMYARITES, the Himayric people, subjugated by the Mohammedans, abt. A.D. 630: see ARABIA.

HIN, n. *hĭn* [Heb.]: an anc. Hebrew measure containing about twelve pints.

HINCKS, SIR FRANCIS, Canadian statesman: b. Cork, Ireland, 1807, Dec. 14; d. Montreal, 1885, Aug. 18. He went to Canada in 1831, set up in business at Toronto, and there became editor of the *Examiner*. In 1841 he entered the first United Parliament as a prominent Liberal. He undertook the editorship of the *Pilot* of Montreal in 1844. From 1851 to 1854 he was Canadian premier, and as such developed the railway facilities and mining resources of the country, and negotiated a treaty of commerce with the United States. In 1855–62 he was governor of Barbadoes, in 1862–9 of British Guiana, later minister of finance, and from 1873 editor of the Montreal *Journal of Commerce*. Among his publications are: *Canada: Its Financial Position and Resources* (1849); *The Political History of Canada between* 1840 *and* 1855 (1877); *The Boundaries Formerly in Dispute between Canada and the United States* (1885).

HINCMAR, *hĭnk'mâr*: abt. 806–882: celebrated French churchman, whose birth-place is unknown, but from his being of the family of the Counts of Toulouse, is presumed to have been in that province. He was educated in the monastery of St. Denis, and, with the sanction of the council of Paris (829), he was intrusted with framing and executing a plan for the reformation of the monastery. Sometime afterward, he was named abbot of the abbeys of Compiègne and St. Germain; and 845 was elected Abp. of Rheims. The most important event, considered histori-

cally, in his career, is his controversy with Pope Nicholas I. 862 (see NICHOLAS I.). Rothadius, Bp. of Soissons, and suffragan of Hincmar, deposed a priest of his diocese, who appealed to Hincmar as metropolitan, and was ordered by him to be restored to office. Rothadius resisting this order, and having been, in consequence, condemned and excommunicated by the abp , appealed to the pope, who at once ordered Hincmar to restore Rothadius, or to appear at Rome in person or by his representative, to vindicate the sentence. Hincmar sent a legate to Rome, but refused to restore the deposed bishop; whereupon Nicholas annulled the sentence, and required that the cause should again be heard in Rome. Hincmar, after some demur, was forced to acquiesce. The cause of Rothadius was re-examined, and he was acquitted, and restored to his see.

The conduct of Hincmar is historically interesting also in relation to the temporal power of the mediæval papacy (see POPES). Under the successor of Nicholas, Adrian II., a question arose as to the succession to the sovereignty of Lorraine, on the death of King Lothaire, the pope favoring the pretentions of Emperor Lewis in opposition to those of Charles the Bold of France. To the mandate which Adrian addressed to the subjects of Charles and to the nobles of Lorraine, accompanied by a menace of the censures of the church, Hincmar offered firm and persistent opposition, boldly declaring that the Roman see had no right to intermeddle in such an affair, and that the threatened papal excommunication would have no validity; and the result was favorable to Hincmar's view. He was equally firm in resisting the undue extension of the royal prerogative in ecclesiastical affairs. When Emperor Lewis III., in opposition to the solemn judgment of the council of Vienne, sought to obtrude an unworthy favorite, Odacer, upon the see of Beauvais, Hincmar boldly remonstrated, and fearlessly denounced the unjustifiable usurpation. Hincmar was probably the most vigorous of French prelates. His works were collected in two vols. folio by Père Sirmond, S.J. (Paris 1645). Several other pieces of his are found in the 8th vol. of Labbe's *Collection of Councils*, and in the 5th vol. of that of Hardouin; as also in Pèrè Cellot's *Concil. Duziac.* (Paris 1658). Many others of his works, still in MS., are enumerated in Wetzer's *Kirchen-Lexicon*, v. 308.

HIND, n. *hīnd* [Icel. *hind;* Ger. *hindinn,* a hind]: the female of the red deer, of which the male is the stag; sometimes, the female of other species of deer, though never of any other European species; sometimes extended even to female antelopes. In strict ancient usage, hind was not applied to the female red deer till the third year of its age. HINDBERRY [Ger. *him-beere,* the raspberry]: in *OE.*, the raspberry, named probably after the female deer.

HIND, n. *hīnd* [AS. *hina,* a domestic: Sw. *hjun,* the member of a family: Icel. *hion,* a family]: a servant; a husbandman; a peasant.—SYN. of 'hind': peasant; rustic; swain; countryman; boor; domestic; attendant.

HIND, a. *hīnd* [AS. *hindan;* Ger. *hinter*, behind: Fin. *hanta*, the tail; *hannassa*, behind]: pertaining to the tail or back part, pertaining to the part which follows, in opposition to *fore*, as hind legs: compar. HINDER, *hīnd'ĕr*, in a position contrary to that of the head or forepart: superl. HIND'MOST, *-mōst*, or HIND'ERMOST, the last; being in the rear of all others. *Note.*—The forms in *most*, as 'hindmost, aftermost, utmost, etc., contain a double comparison, arising from a popular etymology changing *est* into *ost*, due to confusion with the word *most;* the correct superlatives are 'hindest, aftest, and uttest.'

HIND, *hīnd*, HENRY YULE: geologist and author: b. Nottingham, England, 1823. He was educated at Leipsic and at Cambridge; came to Canada in 1846 and was appointed to a post in the Normal School, Toronto; appointed professor of chemistry and geology, Toronto University 1851 and held the position for 13 years; was sent on various geological and geographical commissions by the Canadian Government. His chief published works are, *Narrative of the Red River Exploring Expedition*, 1857 (1860); *Explorations in the Interior of the Labrador Peninsula* (1863); *Eighty Years Progress of British North America* (1863); *Notes on the Northern Labrador Fishing Ground* (1876); *The Effect of the Fishery Clause of the Treaty of Washington* (1877); *Sketch of the Old Parish Burying Ground, Windsor, N. S.* (1889); *History of the University of King's College, Windsor, N. S.* (1890).

HIND, JOHN RUSSELL: English astronomer: b. Nottingham, 1823, May 12; d. Twickenham, 1895, Dec. 23. He early became an enthusiast in the study of astronomy, and in 1840 obtained through the influence of Prof. Wheatstone, a situation in the Royal Observatory at Greenwich, where he remained till 1844, June. Hind was then sent as one of the commission appointed to determine the exact longitude of Valentia, and on his return was appointed to a post in Mr. Bishop's Observatory, Regents Park, London. Here he made those observations, the results of which rendered his name renowned in the scientific world. He calculated the orbits and declination of more than 70 planets and comets, noted 16 new movable stars, and three nebulæ, and discovered 10 new planets, viz., Iris and Flora, 1847; Victoria, 1850; Irene, 1851; Melpomene, Fortuna, Calliope, and Thalia, 1852; Euterpe, 1853; Urania, 1854. In 1851, Hind obtained from the Acad. of Sciences, Paris, the Lalande Medal, and was elected a corresponding member. In 1852, he obtained the gold medal of the Astronomical Soc. of London, and a pension of £200 a year from the British government. He superintended the publication of the *Nautical Almanac*. Hind's scientific papers have generally been published in the *Transactions of the Astronomical Soc.*, in the *Comptes Rendus* of Paris, and the *Astronomische Nachrichten* of Altona. Hind's popular works are—*Recent Comets and the Elements of their Orbits* (*Athenæum*, 1845, Aug. 9); *Astronomical Vocabulary* (16 mo. 1852); *The Comets* (12mo, 1852); *The Solar System* (8vo., 1852); *Illustrated London*

Astronomy (8vo, 1853); *Elements of Algebra* (Lond. 1855); *Descriptive Treatise on Comets* (1857), etc.

HINDER, v. *hĭn'dĕr* [AS. *hindrian*, to hinder—from *hinder*, behind, after: Icel. *hindra*, to hinder]: to put or keep back; to retard progress; to delay; to raise obstacles. HIN'DERING, imp.: ADJ. delaying; obstructive. HIN'DERED, pp. *-dĕrd*. HIN'DERER, *-dĕr-ĕr*, n. one who. HIN'DERANCE, n. *-dĕr-ăns*, or HIN'DRANCE, n. *-drăns*, that which stops progress or advance; impediment.—SYN. of 'hinder': to stop; check; restrain; impede; interrupt; counteract; thwart; oppose; obstruct; debar; arrest; embarrass; clog; encumber; fetter; prevent; shackle; prohibit; exclude; forbid; preclude.

HINDI, n. *hĭn'dē* [native name, a Hindu, the language so called, from *Hind*, India]: language spoken in the valley of the Ganges and its tributaries, from the watershed of the Jumna, as far down as Rajmahal. It is the legitimate heir of the Sanskrit, and fills that place in the modern Indian system which Sanskrit filled in the old. Under the general head of Hindi are included many dialects. It probably had its origin in the country round Delhi. It is the Indian which most nearly approaches Hindustanee.

HINDLEY'S SCREW, *hīnd'lĭz:* a screw cut on a solid whose sides are arcs of the pitch circle of a wheel into which the screw is intended to work; named from its inventor.

HINDU, or HINDOO, n. *hĭn-dô'* [Hind. *Hindi*, or *Hindawi*, a native of India]: a native of Hindustan. HIN'DUISM, n. *-ĭzm*, or HIN'DOISM, n. doctrines and rites of the Hindus. HIN'DUSTAN'EE, or HIN'DOOSTAN'I, n. *-stăn'ē*, the language of the Hindus: ADJ. pertaining to the Hindus or their language.

HINDU KUSH, *hĭn'dô kôsh*, or INDIAN CAUCASUS, *ĭn'-dĭ-an kaw'ka-sŭs:* westward continuation of the Himalaya, sometimes, though questionably, reckoned a part of that colossal range. It extends from the Upper Indus on the e. to the Bamian Pass (q.v.) on the w., stretching in n. lat. between 34° and 36°, and in e. long. between 68° and 75°. Separating Afghanistan on the s. from Turkestan on the n. it sends off the Oxus through the latter and the Helmund through the former, to two salt lakes—the Oxus to Aral, the Helmund to Hamûn. The loftiest summit is Hindu Koh, about 80 m. n. of the city of Cabul, estimated more than 20,000 ft. above the sea. Unlike the Himalaya proper, the chain is a water-shed, and is also remarkably destitute of timber; while like the Himalaya, it presents greater height toward the s. than toward the north.

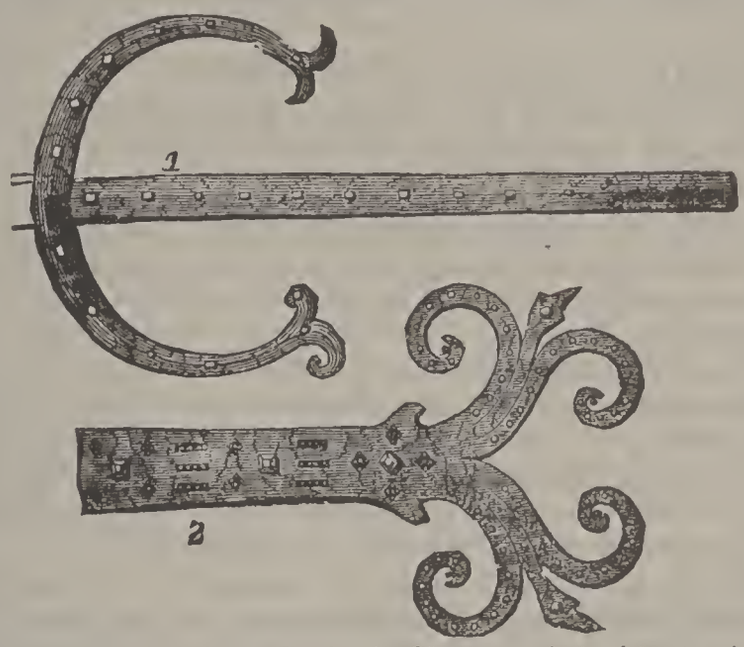
HIN'DU LAW, RELIGION, etc. See INDIA.

HINDUSTAN, *hĭn-do-stân'* (*Land of the Hindus*): term of the same class as Turkestan, Afghanistan, Farsistan, Beloochistan, or as Frangistan (oriental name of w. Europe): see INDIA.

HINGE, n. *hĭnj* [OE. *hing*, to hang: Dut. *henghen*, to

hang—from *henghe*, a hook: Icel. *hengja*, to hang]: the hook or joint on which a door, etc., turns or swings; that on which something depends: V. to furnish with hinges; to hang or depend, as a question. HING'ING, imp. HINGED, pp. *hĭnjd*. TO BE OFF THE HINGES, *hĭn'jĕz*, to be in a state of disorder or irregularity.

HINGE: pivot, hook, or joint on which doors, shutters, etc., turn or move. The simplest form of hinge is a projection cut upon the substance of which the door is made, and



Hinge (copied from Parker's *Glossary of Architecture*)·
1, Compton, Berks; 2, Laon cathedral.

fitted into a hole. This is sometimes done with wooden shutters, and there are instances of *stone shutters* hinged in this manner. The cathedral of *Torcello*, near Venice which dates from the 11th c., still has the windows protected with shutters of large slabs of stone, hinged on stone pivots. During the middle ages, hinges, as well as every other useful article, were made subjects of ornamentation. The earliest ornamental hinges date from about the 10th c. The first specimens are cramped and stiff, and the scrolls are frequently terminated with animals' heads. In the early English and decorated styles, the hinges and other metal-work were very elaborate and beautiful in design, and frequently extended over the whole door. In the perpendicular style, hinges were usually very simple in form, the panelling of the woodwork not admitting much ornamental iron-work. In modern times, hinges have almost entirely lost their ornamental character. They are made chiefly of brass and iron, and fitted on the edges of doors and shutters, where they are also concealed. 'Double-jointed edge-hinges' are now most in use. The revival of mediæval architecture has, however, given an impulse to the manufacture of ornamental metal-work, and highly ornamental hinges of varied and good design are now generally used in connection with Gothic architecture.

HINGHAM, *hĭng'am:* a town of Plymouth co., Mass.; on Massachusetts Bay, and on the New York, New Haven and Hartford R. R., 14 m. s.e. of Boston. It comprises the villages of West Hingham, South Hingham, and Hingham Centre, and is a popular summer resort commanding a fine panorama of Boston Harbor and Mass. Bay. As Barecove it was settled in 1633, and has a meeting house dating from 1681; it has been the favorite residential place of many celebrities. Hingham manufactures cordage, furniture, leather goods, etc. Pop. (1900) 5,059.

HIN'NOM, VALLEY OF. See GEHENNA.

HINNY, n. *hĭn'nĭ* [L. *hinnus*, a mule; *hinnĭō*, I neigh]: the foal of a horse and a she-ass; a mule: V. to neigh. HIN'NYING, imp. HIN'NIED, pp. *-nĭd.*

HINNY, sometimes called JENNET: offspring of the horse and the she-ass; very different from and greatly inferior to the mule, which is a hybrid between the ass and the mare (see MULE). The voice and bodily form of the Hinny resemble those of a horse, and like that animal it has a flowing mane and tail. Its disposition is better than that of the mule. It is of rather small size, is deficient in strength and hardiness, and has no specially valuable qualities. It is bred to some extent in Spain and Barbary, but is not in general use in any part of the world.

HINOID, a. *hĭn'oyd* [mod. L. *hinoideus*]: in *bot.*, term used when veins proceed entirely from the midrib of a leaf and are parallel and undivided, as in the *Zingiberaceæ* and the *Musaceæ.*

HINOJOSA-DEL-DUQUE, *ē-nō-chō'sâ-dĕl-dô-kā':* town of Spain, province of Cordova 45 m. n.w. of the city of Cordova.

HINT, n. *hĭnt* [Icel. *ymia*, to whizz; *ymta*, to rumor; Dan. *ymte*, to whisper]: a distant allusion; slight mention or reference: V. to bring to mind by a slight intimation; to suggest; to allude to distantly; to imply. HINT'ING, imp. HINT'ED, pp. HINT'INGLY, ad. *-lĭ.* TO HINT AT, to allude to slightly or obscurely.—SYN. of 'hint, n.': allusion; notice; insinuation; suggestion; intimation; innuendo; implication; reference; glance; touch.

HIOGO, *hē-ō'gō*, or HIYOGO, *hē-yō'gō*, or FIOGO, *fē-ō'gō* (including KOBE): seaport town of Japan, province of Setsu, on the island of Nipon and the w. shore of Osaka Bay, 40 m. s.w. of Kioto. It was built in the days of the Taira family, and opened to foreign commerce 1860. Since then its development has been rapid, owing in large measure to its admirable harbor, which is annually visited by about 500 foreign vessels, and has been relieved of its former dangers by the construction of a costly breakwater. The chief anchorage is off the suburb of Kobe. Hiogo exports tea (little to London and the great bulk to New York), silk, copper, camphor, wax, tobacco, ginseng, isinglass, and dried fish; and imports woolen and cotton goods; hardware, machinery, and tools. It is regularly laid out, has wide

macadamized streets, is lighted with gas, has a bank and the largest foreign-owned warehouses in Japan, commodious municipal buildings, ship-yard, iron-foundry, paper-pulp factory, and a public ground for out-door sports. Two curious and ancient temples are in vicinity. Pop. (with Kobe) 215,780.

HIOUEN-THSANG, *yô'ĕn-tsang:* celebrated Chinese traveller, professing the Buddhist creed, who visited 110 countries and places of India in the first half of the 7th c. (629–645), and gave a very detailed and interesting account of the condition of Buddhism as it prevailed at that period in India. His inquiries having had reference chiefly to the objects of his veneration, he did not enter so much into details concerning the social and political condition of India as might be desired; but considering the many curious notices he gives on other matters which came under his observation, and the general trustworthiness of his narratives, his memoirs are one of the most important works on the history of India in general, and of Buddhism in particular, during the period stated Apparently, he travelled alone, or with a few occasional companions; and, as he wore the garb of a religious mendicant, with nothing but a staff, wallet, and waterpot, he does not seem to have been exposed to any dangerous adventures on his journey from China to India. It is surprising, however, that he incurred no impediment on his way home, when he travelled with 500 packages of books, besides images of Buddha and various sacred relics; and his immunity from danger affords a remarkable indication of the civilized condition of the country which he described. It does not appear that the account of his travels was written by himself, for of the two works relating to them neither is the performance of Hiouen-Thsang. The first is a bibliographical notice of him in which his travels form a principal feature; it was composed by two of his pupils, Hoei-li and Yen-Thsong. The latter bears the title of *Ta-thang-si-yu-ki*, or 'Memoirs of the Countries of the West, published under the Thang,' and was edited by Pien-ki, since Hiouen-Thsang himself, who during 17 years had spoken none but foreign languages, had perhaps lost the facility of writing elegant Chinese. According to a remark added to the title of his work in the imperial Chinese edition, it would follow that it had been translated from Sanskrit into Chinese, but this statement, as Prof. Stanislas Julien observes, can mean only that the fundamental part of the work relating to history, legends, etc., was taken from Hindu sources, since it is obvious that the indication of distances and numerous personal observations must have come from Hiouen-Thsang himself. Both works have been published in French translation by the distinguished Chinese scholar, Stanislas Julien: *see Histoire de la Vie de Hiouen-Thsang* (Paris 1853), and *Mémoires sur les Contrées Occidentales, par Hiouen-Thsang* (2 vols. Paris 1857–8)—works indispensable to the student of Chinese and Sanskrit literature. An abstract of both works, by the late Prof. H. H. Wilson, appeared in the Journal of the Royal Asiatic Soc. vol. XVII. 106–137.

HIP, n. *hĭp* [Ger. *hüfte;* Dut. *heup;* Icel. *huppr;* the hip, the flank: Norw. *hupp*, the flank]: the projection caused by the haunch-bone and its covering flesh; the upper fleshy part of the thigh (see HIP-JOINT): in *arch.*, the external angle formed by the meeting of two sloping sides or skirts of a roof. HIPPED, a. *hĭpt*, in the sense of beaten; foiled. HIPPED-ROOF, *hĭpt-rôf*, a roof having the ends and the sides of the same slope. HIP-KNOB, ornament carved in stone or wood placed at the point of junction where the sloping sides of a roof meet, or on the summit of a gable or hipped roof, and forming a kind of finial (q.v.). HIP AND THIGH, in *Script.*, wholly; completely. HAVE ON THE HIP, to have a decided advantage over another.

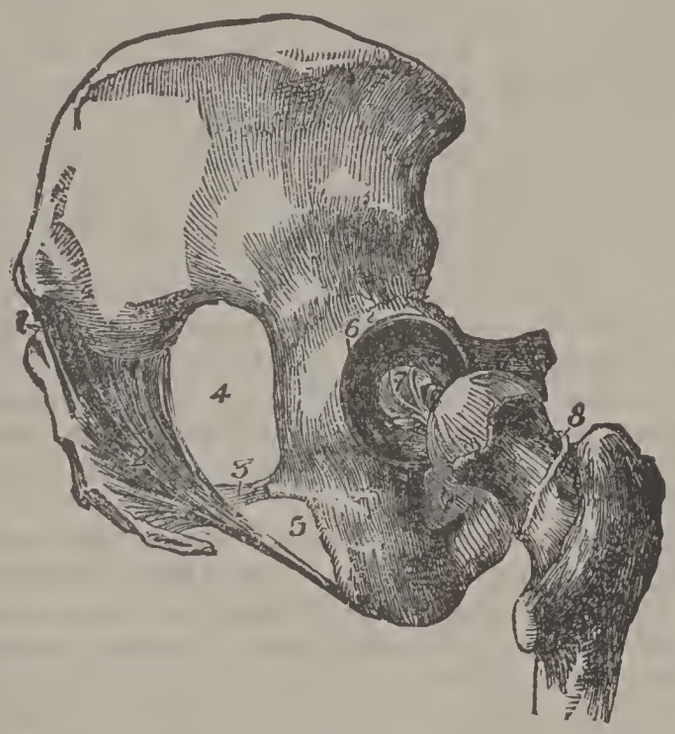
HIP, n. *hĭp* [Sw. *hjupon;* Dan. *hybe;* AS. *hiop*]: fruit of the rose. It is almost always red, and consists of the enlarged fleshy tube of the calyx filled with hard, seed-like *achœnia*, which are surrounded with bristly hairs (*setæ*). The fleshy covering contains mucilage, sugar, gum, malic and citric acids, tannin, resin, and a number of salts. The setæ excite itching in the skin. The fleshy part of hips, beaten to a pulp and preserved with sugar, finds a place in the pharmacopœia, under the name of Conserve of Hips (*Conserva Rosæ Fructûs, Confectio Rosæ Caninæ*, etc.). It is slightly refrigerant and astringent, and is often used as a vehicle or basis for other medicines. Hips eaten entire are a popular remedy for ascarides, on which their action is purely mechanical, due to the irritating setæ. The hips of different species of rose are almost indiscriminately used. In some parts of Europe, hips are preserved in sugar as an article of food, or are dried and used in soups and stews, the achænia and setæ being removed. For this purpose, the large soft hips of the Apple Rose (*Rosa pomifera*) are preferred.

HIP-JOINT: ball-and-socket joint formed by the reception of the globular head of the thigh-bone (or femur) into the deep pit or cup in the *os innominatum*, which is known as the *acetabulum* (from its resemblance to the vinegar cups used by the Romans). If the variety of the movements of this joint—viz., flexion, extension, abduction, adduction, and rotation inward and outward—and at the same time its great strength are considered, it may be regarded as the most complete joint in the whole body.

In the figure the surrounding parts are cut away, and the thigh-bone is drawn out of its socket. The ligaments are usually described as five in number—(1.) The capsular; (2.) the iliofemoral; (3.) The *teres* or round; (4.) The cotyloid; (5.) The transverse. Of these, the capsular ligament, supposed to be removed in the figure, is the most important, and extends from the edge of the cup to the circumference of the neck upon which the ball is carried, inclosing the bony parts in a strong sheath. The iliofemoral is merely an accessory band of fibres which give increased thickness to the capsular ligaments in front, where strength is specially required. The great use of the capsular ligament is to limit the extension of the hip-joint, and thus to

give steadiness to the erect posture. The only other ligament requiring notice is the *L. teres*, or round ligament, which is in reality triangular rather than round, and has its apex attached to the head of the thigh-bone, while its base is connected with the cavity of the acetabulum. Its use is not clearly known, but probably is to limit movement in one direction. It is sometimes absent in cases in which no special weakness of the joint was observed during life, and is not of constant occurrence in mammals. The joint is much strengthened by a large number of surrounding muscles, some of considerable power.

In such a joint as this, though the ligaments materially assist in preventing dislocation, it is obvious that the articular surfaces cannot under ordinary circumstances be kept



Hip-joint:

1, 2, 3, pelvic ligaments; 4, 5, the greater and lesser sacroischiatic foramina; 6, the cotyloid ligament; 7, the round ligament; 8, the cut edge of the lower part of the capsular ligament.

in apposition by them, inasmuch as they must be loose in their whole circumference, to permit of the general movements of the joint. The experiments of Weber show that atmospheric pressure is the real power by which the head of the femur is retained in the acetabulum when the muscles are at rest. 'One convincing experiment is easily repeated—that, namely ,of holding up a side of the pelvis, with its appended lower extremity, the joint not having been opened, and then boring a hole through the acetabulum, so as to admit air into the joint, when the weight of the limb will cause it to drop from half an inch to an inch, the head of the thigh-bone being pulled out of the acetabulum as soon as the air is permitted to pass between the articular surfaces.'—Humphrey *On the Human Skeleton*, p. 74.

Disease of the Hip-joint. Hip-disease differs in so many points of importance from other joint-diseases, and is so serious an affection, that it requires special notice. Its connection with scrofula is more distinctly marked than that of most other joint-diseases, and it almost always occurs before the age of puberty. It comes on, in children or young persons of a scrofulous constitution, from very slight causes; thus, it is often traced to over-exertion in a long walk, a sprain in jumping, or a fall; and in many cases no apparent cause can be assigned. It is a form of tuberculosis.

In the early stage of the disease, the structures of the joint are inflamed, but by proper treatment at this period the morbid action may be sometimes subdued without any worse consequences than a more or less rigid joint. Usually, however, abscesses form around the joint, and often communicate with its interior; and the acetabulum, and the head and neck of the thigh-bone, become disintegrated, softened, and gritty. In a still more advanced stage, dislocation of the head of the thigh-bone commonly occurs, either from the capsular ligament becoming more or less destroyed, and the head of the bone being drawn out of its cavity by the action of the surrounding muscles, or from a fungous mass sprouting up from the bottom of the cavity, and pushing the head of the bone before it.

It is of extreme importance that the symptoms should be detected in an early stage of the disease; and on the least suspicion of this joint being affected, surgical aid should at once be sought.

As the disease advances, abscesses (as above mentioned) occur around the joint, which sometimes, from their tension on the obturator nerve, occasion extreme pain in the inside of the thigh and in the knee. True shortening of the limb now takes place, and the limb at the same time becomes adducted and inverted. From this stage, if the health is good and the lungs are sound, the patient may be so fortunate as to recover with an ankylosed (or immovable) hip-joint; but the probability is that exhaustion and hectic will come on, and that death will supervene, from the wasting influence of the purulent discharges occasioned by the diseased bone. The duration of the disease may vary from two or three months to ten or more years. The treatment must be left entirely in the hands of the surgeon. The most important point is *perfect rest* to the affected part, which may be secured by a strong metal splint, or by a plaster-of-Paris bandage. See Joints, Tuberculosis of the.

HIPPA, n. *hĭp'pa* [Gr. *hippos*, a horse]: typical genus of the family *Hippidæ*, hippians, family of decapod crustaceans, sub-ord. *Anomoura*. The species burrow in the sand. *H. talpoida* is called sand-bug in N. America.

HIPPARCHUS, *hĭp-âr'kŭs:* the first systematic astronomer on record: b., according to Strabo, at Nicæa, in Bithynia. Of the dates of his birth and death, and of his

personal history, nothing is known; but his period of activity seems to have been abt. B.C. 160–125. According to Fabricius, Hipparchus wrote nine separate works, of which only the last and least important, *A Commentary on Aratus*, has come down to us. The other works treated of astronomy and geography. The only authority that we have regarding the discoveries made by Hipparchus is the *Syntaxis* of Ptolemy, from which we learn that Hipparchus discovered the 'precession of the equinoxes,' determined the place of the equinox among the stars, established the solar and lunar theories, invented the Astrolabe (q.v.), and drew up a catalogue of more than 1,000 stars determining the longitude and latitude of each. As Ptolemy also was an astronomer, there is some difficulty in allotting to each his meed of praise for the discoveries mentioned in the *Syntaxis*, which difficulty has given rise to much discussion, resulting in favor of the claims of Hipparchus. See Delambre's *Histoire de l'Astronomie Ancienne* (Paris 1817).

HIPPARION, n. *hĭp-pā'rĭ-ŏn* [Gr. *hipparĭŏn*, a colt, a pony—from *hippos*, a horse]: in *geol.*, extinct tertiary mammal having affinities with the horse; regarded by those who accept the Darwinian hypothesis as a link in the chain of evidence for the evolution of species: see HORSE; FOSSIL.

HIPPELAPH, n. *hĭp'ĕl-ăf* [Gr. *hippos*, horse; *elaphos*, stag, deer]: animal possessing some of the characteristics of the stag and of the horse. It resembles the stag in size and proportions but has rougher and harder hair, and when full grown that of the upper part of the neck is formed into a kind of mane. It has been thought by some to be the *hippelaphus* described by Aristotle. It is a native of Bengal, Sumatra, and the islands of the Indian archipelago.

HIPPIA, n. *hĭp'pĭ-a* [Gr. *hippios*, of a horse: so named because horses are fond of the plant]: type of the sub-tribe *Hippieæ*, a sub-tribe of *Composites*, tribe *Senecionideæ*.

HIPPIAS OF ELIS, (lived about 450 B.C.) a Sophist, mentioned by Plato, Aristotle, and Xenophon, seems to have been an extremely versatile genius who was noted in astronomy, geometry, arithmetic, music, history, and epic and dramatic poetry, as well as philosophy. Apparently he believed in the gods, and a future life, and sought to establish ethics upon a natural basis. Dr. A. Döring, *Geschichte der Grieseschen Philosophie*, (Leipzig 1903), refers to the places where he is mentioned in Greek literature, while Ueberweg-Heinze's *Geschichte der Philosophie* gives a bibliography.

HIPPISH, a. *hĭp'pĭsh*, or HIPPED, a. *hĭpt* [corruption of *hypochondriac*]: somewhat hypochondriac.

HIPPO-, prefix, *hĭp'pō-* [Gr. *hippos*, a horse]: in *science*, *etc.*, of, belonging to, or in any way resembling a horse The prefix is usually *hipp-* before a vowel, as hippelaphus.

HIP'PO, or HIP'PO RE'GIUS. See BONA.

HIPPOBOSCA, n. *hĭp-po-bŏs'ka* [Gr. prefix *hippo-*; *boskō*, I feed]: typical genus of the *Hippoboscidæ*, forest flies; a

family of diptera, sub-ord. *Pupipara*. *H. equina* is the forest-fly, so troublesome to horses.

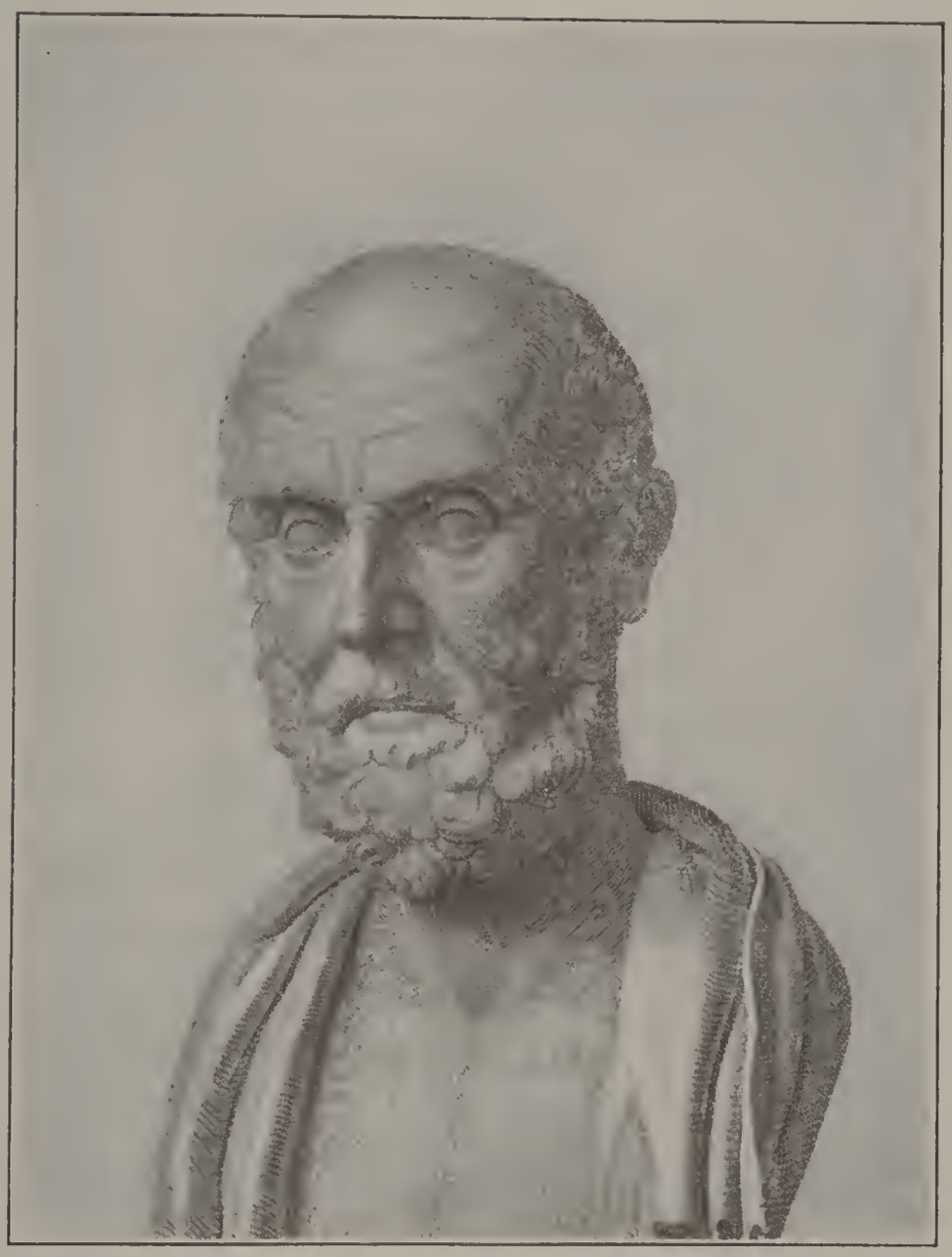
HIPPOBOS'CIDÆ. See FOREST FLY: SPIDER FLY.

HIPPOCAMP, n. *hĭp'pō-kăm*, or HIP'POCAM'PUS, n. *-kăm'pŭs*, or SEA-HORSE [Gr. *hippos*, a horse; *kamptō*, I bend or curve: L. *hippocampus*]: small fish of singular shape, with head and neck like a horse; in *myth.*, a monster, having the head and fore-quarters of a horse attached to the tail of a fish, said to have served Neptune; in *anat.*, a certain curved structure in the brain. HIP'POCEN'TAUR, n. *-sĕn'tawr* [Gr. *hippos*, and *centaur*, which see]: in *anc. fable*, a creature said to be half man and half horse.

HIPPOCAM'PUS, or HIP'POCAMP, or SEA-HORSE: genus of osseous fishes, of ord. *Lophobranchii* (q.v.), family *Syngnathidæ* (see PIPE-FISH); by some naturalists made the type of a separate family, *Hippocampidæ*, remarkably distinguished by the prehensile tail, which is tapering, and quite destitute of fin. The species, not very numerous, but of which some are found in the seas of all parts of the world, are fishes of very extraordinary habits and form, with curious suggestion of likeness to a horse. They have the jaws united and tubular, as in the pipe-fishes; the body compressed, short, and deep; the whole length of the body and tail divided by longitudinal and tranverse ridges, with tubercles at their intersections. The scales are ganoid, clothing the whole body in a kind of armor. The males have pouches on the tail in which the eggs are carried till they are hatched. They swim in a vertical position, and are always ready to entwine their tails around seaweeds, or even with one another. They are very interesting in an aquarium.

HIPPOCRAS, or HYPOCRASS, n. *hĭp'pō-krăs* [after the ancient physician *Hippocrătēs*]: aromatic medicated wine, supposed to have been made first from a recipe by Hippocrates; formerly much used, and still sometimes used in parts of Europe. The following was the method of preparing it: 12 pints of Lisbon were mixed with an equal quantity of canary wine. Bruised spices of various kinds were digested in the wine for three or four days, after which it was strained, and two pounds and a half of lump-sugar were added. It was doubtless good for the purposes of a cordial. HIP'POCRAT'IC, a. *-krăt'ĭk*, of or pertaining to Hippocrates. HIPPOCRATIC FACE, denoting pale, sunken, and contracted features in disease, or when dying—as described by Hippocrates. HIPPOCRATIC OATH, formula sometimes attributed to Hippocrates, for the subscription of those about to become physicians, promising good faith to the profession and good conduct.

HIPPOCRATES, *hĭp-pŏk'ra-tēz:* most celebrated physician of antiquity: b. (according to Soranus) in the island of Cos B.C. 460; d. Larissa, Thessaly, at age variously stated 85 to 109 years; son of Heracleides, who was also a physician, and of the family of the Asclepiadæ—Hippocrates being either from the 19th or the 17th in descent from



HIPPOCRATES.

Æsculapius. His mother, whose name was Phænarete, was said to be descended from Hercules. He is said to have been instructed in medicine by his father and by Herodicus, and in philosophy by Gorgias of Leontini, celebrated sophist, and Democritus of Abdera, whose cure from insanity he afterward effected. After travelling through Greece, he settled and practiced his profession at Cos. We know little more of his personal history than that he was highly esteemed as physician and author, and that he raised the medical school of Cos to a very high reputation. Hippocrates was the first to discard superstition and to use inductive philosophy as the basis of medical practice. His works were studied and quoted by Plato. Various fabulous stories are recorded of him by Greek writers; also legends in Arabic writers, who term him 'Bokrát,' while the European story-tellers of the middle ages celebrate him under the name of 'Ypocras,' and, in defiance of chronology, make him prof. of medicine at Rome, with a nephew of wondrous medical skill, whom he dispatched in his own stead to the king of Hungary.

The works termed the Hippocratic Collection are more than 60 in number, and, as Dr. Greenhill observes in his article on Hippocrates in Smith's *Dictionary of Greek and Roman Biography*, etc., 'the classification of these, and assigning each (as far as possible) to its proper author, constitutes by far the most difficult question connected with ancient medical writers.' Dr. Greenhill divides the Hippocratic collection into eight classes; of which only two need here be specified (for convenience using the Latin instead of the Greek titles).

Class I.—Works *certainly* written by Hippocrates, containing *Prognostico; Aphorismi; De Morbis Popularibus; De Ratione Victus in Morbis Acutis; De Aëre, Aquis, et Locis;* and *De Capitis Vulneribus.* Some eminent critics doubt the genuineness of some portions of the *Aphorismi*, the work by which Hippocrates is most popularly known.

Class II.—Works *perhaps* written by Hippocrates. These are 11 in number; one is the well-known *Jusjurandum*, or 'Hippocratic Oath.'

The others consist of works written before Hippocrates; works whose author is conjectured; works by quite unknown authors; and wilful forgeries.

In general Hippocrates divides the causes of disease into two principal classes: the first the influence of seasons, climates, water, situation, etc.; the second, more personal causes, e.g., the food and exercise of the individual patient. His belief in the influence which different climates exert on the human constitution is very strongly expressed. He ascribes to this influence both the conformation of the body and the disposition of the mind, and hence accounts for the differences between the hardy Greek and the Asiatic. The four fluids or humors of the body (blood, phlegm, yellow bile, and black bile) were regarded by him as the primary seats of disease; health was the result of the due combination (or *crasis*) of these, and illness was the consequence of

a disturbance of this crasis. When a disease was proceeding favorably, these humors underwent a certain change (or *coction*), which was the sign of returning health, as preparing the way for the expulsion of morbid matter, or *crisis*, these crises having a tendency to occur at definite periods, which were hence called 'critical days.' His treatment of diseases was cautious, now termed expectant; it consisted chiefly, often solely, in attention to diet and regimen; and he was sometimes reproached with letting his patients die by doing nothing to keep them alive.

The works of Hippocrates were translated at an early period into Arabic. They were printed first in a Latin translation (Rome 1525). The first Greek ed. (the Aldine) appeared the following year at Venice; an ed. by Mercurialis, 1588, by Foësius, 1595, and by Van der Linden (still much esteemed) 1665. Other editions have appeared under the editorship of Chartier, Kühn, etc. The latest, and incomparably the best ed. is that of Littré, 10 vols., the first of which appeared 1839, the last 1861. An ed. by Ermerins, with Latin translation, is in course of publication at Utrecht at the expense of the Univ. of Amsterdam. The Latin title runs as follows: *Hippocratis et aliorum Medicorum veterum Reliquiæ. Edidit Franciscus Zacharias Ermerius.* The first three vols. appeared 1859–63. An excellent English translation of *The Genuine Works of Hippocrates* was published 1849, in 2 vols., by Dr. Adams.

HIPPOCRENE, *hĭp-po-krē′nē* [from *hippos*, horse, *krēnē*, fountain]: fountain on Mount Helicon, about 20 stadia above the grove of the Muses, and, according to the mythical account, was produced by a stroke from the hoof of the horse Pegasus (q.v.). It was sacred to the Muses. In modern times some have attempted to identify it with a fine spring at Makariotissa; and this opinion is probably correct. See HELICON.

HIPPOCREPIFORM, a. *hĭp′pō-krĕp′ĭ-fawrm* [Gr. *hippos*, a horse; *krēpĭs*, a sandal, a shoe; L. *formă*, shape]: in *bot.*, having a horseshoe shape.

HIPPODAMIA, *hĭp-po-da-mī′â*: in mythology, the beautiful daughter of Ænomaus, King of Pisa, in Elis, and of the Pleiad Asterope. It had been predicted to her father that he should be slain by his future son-in-law; he therefore stipulated that every suitor of his daughter should run a chariot-race with him, and that death should be the consequence of defeat. Thirteen, or, as some say, seventeen, suitors had already been conquered and slain, when Pelops came to Lydia. Pelops bribed Myrtilus, the king's charioteer, and thus succeeded in reaching the goal before Œnomaus, who, in despair, killed himself. Hippodamia became wife of Pelops and mother of Atreus and Thyestes. She afterward destroyed herself from grief, at being reproached with having led her sons to murder each other.

HIPPODROME, n. *hĭp′pō-drōm* [Gr. *hippos*, a horse; *dromos*, a running-course]: Greek name for the place set apart for horse and chariot races. Its dimensions were,

according to the common opinion, half a mile in length, and one-eighth of a mile in breadth. In contruction and all important points of arrangement, it was the counterpart of the Roman Circus (q.v.) with the exception of the arrangement of the chariots at the starting-place. In the hippodrome, the chariots were arranged to form two sides of an isosceles triangle, with the apex toward the goal and a little to the right side. But as this would have given the chariots on the left side a longer course than those on the right, the hippodrome was constructed with the right side longer than the other (see figure of CIRCUS). The start was effected by setting free the chariots on the extreme right and left, and when they came opposite the next two, by setting them free also, and so on till all were in motion. The hippodrome was also much wider than the Roman circus, to allow for the greater number of chariots, for though we have no precise information as to the number that usually started in one race, we know that Alcibiades on one occasion sent seven; Sophocles mentions ten chariots as competing at the Pythian games; and the number at the Olympic games must have been considerably greater. There is a beautiful description of a chariot-race in Homer (*Iliad*. xxiii. 262–650. The golden age of the hippodrome was during the Lower Greek Empire. The Blue and Green factions in the hippodrome carried their animosity into all departments of the public service, and laid the foundation of that perpetual disunion which rendered the Byantine empire a prey to every aggressor. The term hippodrome is now sometimes given to a large circus; e.g., to one built on a colossal plan (cost $2,000,000), at 6th Ave. between 43d and 44th Sts., New York City, and opened in 1905.

HIPPOGLOSSUS: same as Halibut (q.v.).

HIPPOLYTUS, *hĭp-pŏl′ĭ-tŭs;* ecclesiastical writer: b. prob. in the latter half of the 2d c.; d. prob. after 235. He is believed to have been Bishop of Portus, the harbor of Rome, opposite Ostia; and was long thought to have suffered martyrdom under Alexander Severus; though the martyrdom is now with much probability reduced to a banishment to Sardinia where he may have died. Prudentius's account of his martyrdom is shown by Döllinger to be almost certainly untenable. There were in the early church many other saints and martyrs of this name. All the facts connected with the history of this Hippolytus have long been the subject of controversy; and the interest of the discussion has been heightened of late years by the discovery of a very curious and important work, certainly of the age of the supposed Hippolytus, and, if a genuine work of that author, throwing curious light upon the early history of the church. The work in question was one of several Greek MSS. obtained at Mount Athos 1842, by M. Menas, agent of the French govt., and was published 1851, at the expense of the Univ. of Oxford, to which it was recommended as a work of exceeding interest for the history of the early church by Emmanuel Miller, who under-

took to edit it. Miller published it as a work of Origen, under the title of *Origenis Philosophumena*. Baron Bunsen was the first to conjecture that the true author was Hippolytus, but he mistook as to the particular work of Hippolytus which he took it to be; and for a time the question of the authorship remained uncertain. Some critics still adhered to the opinion that the author was Origen; some ascribed the work to the Roman priest Caius, others to Tertullian; others to some unknown Novatian heretic. The result of the discussion seems to be that though Bunsen was wrong in supposing this treatise to be work of Hippolytus, which Photius had described as a '*little treatise* against heresies,' by that author. yet it is in reality a *larger treatise* on the same subject and by the same author.

There still remained, however, a further question, namely, Who is the Hippolytus who is to be regarded as the author? Without reckoning many later saints of that name, Dr. Döllinger, in his *Hippolytus und Kallistus*, enumerates at least six contemporaneous, or nearly contemporaneous, with the supposed Hippolytus of Portus. Though certainty has not been reached, the opinion that the author of the *Philosophumena* was the Hippolytus already known in the ancient church as a writer and bishop, has met almost universal acceptance.

From the autobiographical details in the treatise, added to particulars already known, we learn that this Hippolytus, the time and place of whose birth are uncertain, was, about 218, Bishop of Portus, near Ostia, a suburban see of Rome; and as such, a member of the ecclesiastical council of that city. This fact has decisive confirmation from a statue discovered in Rome 1561, inscribed with the name of Hippolytus, the title of his see, 'Portuensis,' and the paschal cycle of which Hippolytus is known to have been the author. In the persecution of Maximin, 235, Hippolytus was exiled to the unhealthful island of Sardinia. Probably from the connection of his see with the church at Rome, Hippolytus was active in the affairs of that church, and placed himself in violent opposition to the Bishop Callistus, whom he denounces in the treatise in the most unmeasured terms, both as to his private character and his public administration, as a person of most disreputable antecedents, as well as criminally lax in the government of the church, and especially in the administration of penance, after his election to the see. The tone which he adopts toward the Roman bishop, indeed, is so disrespectful as to appear to the Prot. critics a clear and conclusive evidence that, in the church of the first half of the 3d c., that bishop cannot have possessed the supremacy which the advocates of the papal pretensions ascribe to him. It is difficult, in truth, to conceive any bishop in the modern Roman system addressing the pope in such terms as those which Hippolytus applies to Callistus. Hippolytus protested against restoring the lapsed to church-fellowship; concerning the

Trinity he held to subordinationism against the patripassianism of Roman orthodoxy.

The Rom. Cath. critics reply, with considerable force, that the very violence of the language employed and the unscrupulous nature of the imputations, contain their own refutation; and they contend that no argument can be founded on Hippolytus's oppositon to the authority of the Roman bishop, inasmuch as not only the opinions expressed in this very treatise, but also the direct testimony of Prudentius (Hymn xi. v. 170–180), show him to have been tainted with the Novatian heresy, or rather, though somewhat earlier, with the same opinions which in Novatus were condemned as heretical, and which eventuated in the Novatian schism. The validity of this plea, however, is strongly controverted by Bunsen. The works of Hippolytus, which are numerous, and which comprise dogmatical, exegetical, ascetic, and chronological treatises, were first published in a collected form by Fabricius, Hamburg, 1716–18. They are found also in the second volume of Gallandus. See Bunsen's *Hippolytus and his Age* (1852; 2d ed. 1854); Miller's *Origenis Philosophumena* (Oxford, 1851); Döllinger's *Hippolytus und Kallistus* (Regensburg, 1853); Wordsworth's *St. Hippolytus and the Church of Rome in the Third Century* (Lond. 1853).

HIP'POMANE. See MANCHINEEL.

HIPPOPATHOLOGY, n *hĭp'pō-pă-thŏl'ŏ-jĭ* [Gr. *hippos*, a horse, and Eng. *pathology*]: the doctrine or description of diseases of horses.

HIP'POPHAË. See SALLOW-THORN.

HIPPOPHAGI, n. plu. *hĭp-pŏf'ă-jĭ* [Gr. *phagō*, I eat]: eaters of horse-flesh, according to the accounts of the old geographers, a Scythian people, living n.e. of the Caspian Sea, where now roam the Kalmuck hordes, who, retaining all the peculiarities of the old Scythians, still regard horse-flesh as a dainty. HIPPOPH'AGOUS, a. *-gŭs*, feeding on horses. HIP'POPH'AGY, n. *-pŏf'ă-jĭ*, the practice of eating horse-flesh.

HIPPOPODIUM, n. *hĭp'pō-pō'dĭ-ŭm* [Gr. *hippos*, a horse: *pous*, or *poda*, a foot]: in *geol.*, a large heavy bivalve characteristic of the lower lias shales of England.

HIPPOPOTAMUS, n. *hĭp'pō-pŏt'ă-mŭs* [Gr. *hippos*, a horse; *pŏtămos*, a river]: genus of artiodactyle ungulate mammals, constituting a family by itself. Till of late, only one species was known as now existing, though the fossil remains of others indicate the greater abundance and wider distribution of the form in earlier periods of the earth's history. The largest and best known species, *Hippopotamus amphibius*, is—or, within historic periods, has been—found in almost all parts of Africa, to which quarter of the globe it is confined. A smaller species, *Hippopotamus Liberiensis*, has recently been described as an inhabitant of the rivers of w. Africa within the tropics, and is said to differ remarkably from the common species, and from all the fossil species in having only two incisors, instead of four,

in the lower jaw. The common hippopotamus is one of the largest of existing quadrupeds, the bulk of its body being little inferior to that of the elephant; though its legs are so short that its belly almost touches the ground, and its height is not much above five feet. It is extremely aquatic in its habits, living mostly in lakes or rivers, often in tidal estuaries, where the saltness of the water compels it to resort to springs for the purpose of drinking, and sometimes even in the sea, though it never proceeds to any considerable distance from the shore. Its skin is very thick—on the back and sides, more than two inches; it is dark brown, destitute of hair, and exudes in great abundance from its numerous pores a thickish oily fluid, by which it is kept constantly lubricated. The tail is short. The feet have each four toes, nearly equal in size, and hoofed. The neck is short and thick. The head is very large, with small ears, and small eyes placed high, so that they are easily raised above water without much of the animal being exposed to view. The muzzle is very large, rounded, and tumid, with large nostrils and great lips concealing the large front teeth. The hippopotamus cuts grass or corn as if it were done with a scythe, or bites with its strong teeth a stem of considerable thickness neatly through. The skull, while distinguished by remarkable peculiarities, corresponds in the most important characters with that of the hog. The respiration of the hippopotamus is slow, and thus it is enabled to spend much of its time under water, coming to the surface at intervals to breathe. It swims and dives with great ease, and often walks along the bottom, completely under water. Its foods consists chiefly of the plants which grow in shallow waters, and about the margins of lakes and rivers; and it probably renders important service in preventing slow streams from being choked up by the luxuriance of tropical vegetation, the effect of which would be an increase of the extent of swampy land. It often, however, leaves the water, chiefly by night, to feed on the banks, and makes inroads on cultivated fields, devouring and trampling the crops. It is gregarious; and the havoc wrought by a herd of 20 or 30 is very great, so that wherever cultivation extends, war is waged against the hippopotamus, and it disappears from regions where it formerly abounded. Thus it is no longer found in Lower Egypt, though still abundant further up the Nile. It is taken in pits, which are dug in its usual tracks; it is killed by poisoned spears, is pursued by means of canoes, is harpooned, and is shot with the rifle. The flesh is highly esteemed; the fat, of which there is a thick layer immediately under the skin, is a favorite African delicacy, and when salted, is known at the Cape of Good Hope as *Zeekoe speck*—that is, Lake-cow bacon. The tongue, and the jelly made from the feet, are much prized. The hide is used for a variety of purposes; and the great canine teeth are particularly valuable as ivory, and are a considerable article of African commerce.

The hippopotamus is lively and playful in its native waters; it soon learns to avoid man, and when it cannot

retire among reeds for concealment, it dives and remains long under water, raising only its nose to the surface when another breath becomes necessary. The female hippopotamus may sometimes be seen swimming with her young one on her back. The hippopotamus is generally inoffensive, but is occasionally roused to fits of rage, in which it becomes extremely dangerous, particularly to those who pursue it in boats. The voice of the hippopotamus is loud and harsh, and is likened by Burckhardt to the creaking and groaning of a large wooden door. That the hippopotamus is capable of being tamed, and of becoming much attached to man, has been proved by the instances of living specimens in London and Paris. The first hippopotamus brought to Europe in modern times, a young one from the Nile, arrived in London 1850. The hippotamus, however, sometimes appeared in the spectacles of the ancient Romans, It is generally supposed to be the Behemoth of the book of Job.

Fossil species.—Six species of hippopotamus have been described from the later Tertiary strata—the Pleiocene and Pleistocene of Lyell. They occur in fresh-water marls, and in the bone-caves, into which they had been carried for food by the carnivorous animals that used the caves as dens. One fossil species found in England and in considerable abundance in s. Europe, was of a size as much greater than the living species, as its companion, the mammoth, was greater than the living elephant. The abundant remains of the fossil hippopotamus in Sicily are deemed to prove that that island, in geologic times, must have been united to Africa.

HIPPOSTEOLOGY, n. *hĭp-pŏs-tē-ŏl'o-jĭ* [Gr. *hippos*, a horse; *ostĕŏn*, a bone; *logos*, discourse]: branch of science dealing with the osteology of the horse.

HIPPOTHERIUM, n. *hĭp'pō-thē'rĭ-ŭm* [Gr. *hippos*, a horse; *thērĭŏn*, a wild beast]: in *geol.*, a mammal of the miocene tertiaries, so called from its resemblance to the horse family. See HIPPARION.

HIPPURIC, a. *hĭp-pū'rĭk* [Gr. *hippos*, a horse; *ouron*, urine]: applied to an acid obtained from the urine of horses or cows. HIPPURIA, n. *hĭp-pū'rĭ-ă*, an excess of hippuric acid in the urine.—*Hippuric acid*, formula $C_9 H_9 NO_3$ an organic acid, the product of the metamorphosis of the bodily tissues, especially of herbivorous animals. It is a normal constituent of the urine of the horse, cow, sheep, goat, hare, elephant, etc.; and probably is to be found in the urine of all vegetable feeders. In the human urine of healthy persons living on an ordinary mixed diet, it occurs in very small quantity, but it is increased by an exclusively vegetable diet, and the well-known disease diabetes; and it may be caused to appear in the human urine in considerable quantities by the administration of benzoic acid with the food. It is most conveniently prepared by boiling horse urine with milk of lime, filtering, neutralizing with hydro-chloric acid, and evaporating to about one-eighth of its volume. The concentrated urine is then

acidified with hydrochloric acid and allowed to stand, when impure hippuric acid comes down as a yellowish-brown precipitate. To purify the crude product, it is heated to 212° F. with not quite enough water to entirely dissolve it, and chlorine gas is passed through the solution until the unpleasant smell has entirely disappeared. The solution is then filtered while hot, and the crystals which separate upon cooling are isolated and subjected again to the same treatment, the chlorine being passed through the solution, in this second treatment, until the solution is bright yellow. When thus prepared, hippuric acid crystallizes from water in the form of large prismatic plates. Its crystals are colorless or white, free from odor, and have a slightly bitter taste. It is soluble in boiling water and hot alcohol, but only slightly soluble in cold water and in ether. When boiled with dilute hydrochloric-sulphuric, nitric or oxalic acid, it yields benzoic acid and glycocoll.

HIPPURITES, n. *hĭp′pū-rīts* [Gr. *hippos*, a horse; *oura*, a tail]: in *geol.*, very remarkable genus of fossil bivalve shells, massive, and of horse-shoe shape, peculiar to the Cretaceous strata, and so abundant in some lower chalk-beds of the Pyrenees and other places, that the series has received, from some continental geologists, the name Hippurite Limestone. The external form of the shell is so anomalous, that the genus has been tossed about by naturalists in an extraordinary manner; some have called it a coral, others an annelid, others a balanus, but the majority class it as a mollusk, differing, however, among themselves whether it is a brachiopod, conchifer, or cephalopod. The true relation of the genus has been lately determined by S. P. Woodward, who has published a full description of its curious and anomalous structure in the *Journal of the Geological Soc.*, XI. 40. He has shown that it is a lamellibranchiate mollusk. The lower and fixed valve is produced and tapering, in some species reaching a length of more than a foot. On the one side are three furrows, representing the syphonal, muscular, and ligamental inflections of the shell. The upper and free valve formed a flat covering to the large lower valve. Sixteen species have been described. HIP′PURITES, n. in *geol.*, genus of coal-measure plants, so called from their close resemblance to the common HIPPURIS, *hĭp′pū-rĭs*, or mare's tale of the marshes.

HIPPUS, n. *hĭp′pŭs* [Gr. *hippos*, a horse]: in *path.*, a morbid trembling and twinkling of the eyes.

HIRCINE, n. *hĕr′sĭn* [L. *hircus*, a he-goat]: a fetid oily matter found in goat's or sheep's fat. HIR′CIC, a. *-sĭk*, applied to an acid derived from hircine.

HIRE, v. *hīr* [AS. *hyre;* Dut. *huur;* Ger. *heuer;* W. *hur*, wages, payment for service]: to procure the use of, for a certain time, and at a certain price, to engage; as servants; to let out for money: N. the price paid for the loan or temporary use of anything; wages. HI′RING, imp.:

N. an engagement to service (see below): ADJ. applied to a place where engagements to service are entered into. HIRED, pp. *hīrd.* HIRE'LING, n. one who serves for wages; a mercenary—usually in a bad sense.—SYN. of 'hire, n.': salary; stipend; allowance; pay; price; reward; compensation; recompense; payment.

HIREN, n. *hī'rĕn:* in OE., a sword; a fighting man or swaggerer; a prostitute. *Note.*—HIREN is said to be (1) a play upon the word *Irēnē*, the Greek goddess of peace, or (2) a play on the word *iron.*

HIR'ING: contract by which one employs, for a limited time, another's property or labor for some compensation. Where the thing hired is land or houses, see LANDLORD and TENANT. For various other divisions of the subject, see INN; LODGINGS; SERVANTS; CARRIERS; SHIPPING. As to the hiring of task-work or job-work, it is sometimes difficult to establish a contract of this kind, but in general there must be either an express or implied contract to pay for the services. Thus, if A, seeing B's horse running away, at some expense catches it, and brings it back to B, there having been no contract or engagement on B's part to pay, he is not bound to pay A for his services, however beneficial they have been, nor can A keep B's horse till such expenses are paid. So, if B has deposited a chattel with A, who has incurred extraordinary expense in preserving it, B is not bound to pay anything. When a person is hired to do a thing in a given time, and takes much longer, or deviates from the contract, he is nevertheless entitled to be paid for his stipulated services, for the contract is not rescinded on these grounds, unless there was an express stipulation to that effect. Incompetence, neglect, waste, or loss, by one hired for service, may expose him to loss of wages, and to discharge; though in such cases reference must be had to the expressed or understood terms of the contract. The law differs in different states as to the claim of a person hired and without reasonable cause breaking his contract, to recover wages for service actually rendered. During the progress of the contract, it is sometimes material to know which of the parties bears the loss in case of fire. It is difficult to lay down the rule in such cases, for everything depends on the nature of the contract. Whoever is the owner, in law, of the material at the time bears the loss of it by an accidental fire. If, for example, a tailor engage to make a coat and to furnish the materials for a fixed sum, this is, in fact, two contracts—viz., a sale of the materials, and also labor and work bestowed on them; and in case of destruction of the subject before completion, the loss of the material falls on the hirer, and the loss of the labor falls on the workman. So if a printer engaged for a fixed sum per sheet to print and complete a book, the hirer would bear the accidental loss of the paper, and the printer the loss of his labor and skill. Much, however, depends in all these cases on the terms of the contract. Where a workman engages to do useful work, he impliedly warrants to have reasonable skill; otherwise, if the work be useless, he cannot

recover his money. In the case of robbery while goods are in the hands of a workman, if the robbery resulted from his negligence, he bears the loss: so if he merely lost it. In case of a horse or chattel being hired, the hirer is bound to use all reasonable care for its preservation.

HIRPLE, v. *hĕrp'l:* in *Scot.*, to halt, as from lameness; to limp; to move crazily. HIRP'LING, imp. HIRPLED, pp. *hĕrp'ld.*

HIRSCH, *hĭrsh,* EMIL GUSTAV, American rabbi: b. Luxemburg, Germany, 1852, May 22. He studied at the University of Pennsylvania and at Berlin, was rabbi successively in Baltimore, Md. (1877) and Louisville, Ky. (1878–80), and in 1880 was chosen minister of the Sinai congregation of Chicago, Ill. In 1880–7 he was editor of the *Zeitgeist* of Milwaukee, Wis., and later became editor of the *Reform Advocate* of Chicago. He was appointed professor of rabbinical literature in Chicago University in 1892. He appeared as an orator on various patriotic and other occasions, and wrote several monographs on religious and Biblical topics. He was also prominent in Republican State politics, and in 1896 was presidential elector-at-large for Illinois.

HIRSCH (DE GEREUTH, Baron MAURICE DE: 1831–1896, Apr. 20; b. Munich, Bavaria: Jewish financier and philanthropist. He was sent by his father, the first baron (ennobled 1869) to Brussels at the age of 13; at 17 he left school and went into business. He married Mlle. Bischoffsheim, daughter of a wealthy Belgian senator. At the failure of the firm of Dumonceau, Hirsch secured the most valuable of their assets, including the right to construct the Turkish railways. In this work of railway construction he was so successful that he eventually became one of the richest men in the world, leaving at his death, after all his benefactions, a fortune estimated at $200,000,000. The death of his only son led him to devote $20,000,000 in the son's behalf wholly to charities, especially for the Hebrews of Russia, Hungary, Galicia, and Roumania. On the expulsion of the Jews from Russia, Hirsch devised a scheme of colonization to which he guaranteed $10,000,000. Nearly 500,000 acres of land were secured in the Argentine Republic, on which more than 1,200 families have been settled, of whom a large proportion have become independent of charitable aid. He also established (1891) in the United States the HIRSCH FUND amounting to about $2,500,000 for assisting needy Hebrew immigrants especially in the way of furnishing tools and teaching simple trades. His other benefactions were very numerous and extensive, estimated at $15,000,000 in a single year. In all his gifts aggregated $50,000,000, and his wife, after his death, continued his benefactions.

HIRSCH FUND, BARON DE: a gift of $2,400,000 for the education and improvement of a certain class of Jewish immigrants to the United States, incorporated in New York, 1891; Myer S. Isaacs, pres.; Jacob H. Schiff, vice-

pres.; Jesse Seligman treas.; Julius Goldman, sec.; Henry Rice, J. H. Hoffman, Oscar S. Straus, of New York; and Mayer Sulzberger and W. B. Hackenburg, of Philadelphia, constituting the trustees. The fund was established by Baron de Hirsch owing to the large immigration due to the enforcement in Russia of the May Laws in 1881, and the outbreaks in that country against the Jews. It was directed in the deed of trust that the funds be used to relieve Jewish immigrants from Russia and Rumania, to educate them, to supply transportation to properly selected emigrants and settle them where they can become self-supporting, and others to places where relatives or friends reside. In addition it was stipulated that emigrants be taught trades, agriculture, and the English language.

The material necessities were first relieved and many were taught the manufacture of clothing and white goods, etc.; the United Hebrew churches of New York being the agent of distribution and is still in that capacity for those less than two years in the United States. Classes in English were quickly formed for children, to fit them for the public schools, as well as for adults, to enable them to learn quickly, while a trade school, now in East 64th street, near Third avenue, was organized for the mechanical trades, which has graduated hundreds of young men in the lines of carpentry, house and sign painting, plumbing, machinist's and electrician's trades . To extend colonization, Woodbine was founded in Cape May county, N. J., with a well-equipped agricultural school, and the town is flourishing. In addition the fund aids the Jewish Agricultural and Aid Society, for encouraging agriculture by lending money on mortgage for the purchase of farms. One of its objects, too, is to distribute the emigrants throughout the country by means of the Industrial Removal office. The fund aids also educational agencies in Philadelphia, Brooklyn, St. Louis, and elsewhere whereby the newly arrived immigrant is Americanired and made self-supporting.

HIRSEL, n. *hĕrs'l* or HIRDSEL, n. *hĕrd'sl* [Scot.: old Swed. *haer*, an army; *saella*, to assemble]: in *Scot.*, a multitude; a throng; a flock of sheep: V. to class into different flocks; to dispose in order. HIRS'ELLING, imp. HIRSELLED, pp. *hĕrs'ld.*

HIRSIL, or HIRSLE, v. *hrĕs'l* [AS. *hirstlan;* Teut. *aerselen*, to move or creep while sitting on the buttocks]: in *prov. Eng.* and *Scot.*, to move resting on the hams or while sitting; to fidget: N. the act of moving in a creeping manner when sitting or reclining. HIRS'ILLING, imp. HIRSILLED, pp. *hĕrs'ld.*

HIRSUTE, a. *hĕr-sūt'* [L. *hirsūtŭs*, rough, hairy]: covered with long stiffish hairs thickly set; hairy. HIRSUTE'NESS, n. *-nĕs*, hairiness.

HIRUDINEA, n. *hĭr'ū-dĭn'ĕă* [L. *hirūdo*, or *hirūdĭnem*, a leech, a blood-sucker]: in *zool.*, the ord. of annelida including the leeches.

HIS, *hĭz:* pers. pron. poss. of HE, which see.

HISCOCK, *hĭs'kok*, FRANK: lawyer: b. Pompey, N. Y., 1834, Sep. 6. He received an academical education, was admitted to the bar 1855, began practice in Tully, Onondaga co., N. Y.: was dist.attor. of the county 1860–63, member of state constitutional convention 1867, member of congress (republican) 1879–86, and elected U. S. senator for the term 1887–93. As representative he was chairman of the committee on appropriations, and as senator he was chairman of the committee on the centennial of the constitution, and is a member of the committees on coast defenses, finance, interstate commerce, and patents.

HISPANIA, *hĭs-pā'nĭ-a:* name by which Spain was it known to the Romans. According to W. von Humboldt, it is only a modified form of the original name, which he derives from *Ezpaña*, a Basque word, meaning a 'border' or 'limit,' and which he understands to imply that the country formed the margin of Europe toward the Western Ocean. Of the other ancient names of the country, the chief are *Iberia*—the common designation among the Greeks and believed to denote specially the region of the Iberus (modern Ebro)—and *Hesperia*, on account of its western situation.

Little definite or accurate knowledge of Hispania was possessed before the time of the Romans. The conquests of the Carthaginians first excited the alarm of the Romans, and led to the struggle on Spanish soil of these two great rivals. After the complete triumph of the Romans, these indefatigable conquerors set themselves for two or three centuries to the thorough subjugation of the whole country. This was finally effected in the time of Augustus, who also founded many Roman cities, adorned with splendid architecture, such as Cæsar Augusta (*Zaragoza*), Emerita Augusta (*Merida*), Pax Julia (*Beja*), Pax Augusta (*Badajoz*), Legio VII. Gemina (*Leon*), etc., and completed the system of military roads across the peninsula, begun B.C. 124. Great numbers of Romans then flocked into the country, and settling there, mixed with the native Iberi, some of whom completely adopted Roman habits, and were spoken of as *Togati*.

To what stock of the human family the old Iberi of Hispania belonged, is one of the *quæstiones vexatæ* of scientific ethnography. That they are now represented by the Basques (q.v.) is universally admitted. Niebuhr holds that Hispania was originally peopled by Celts and Iberi, from a mixture of whom arose the *Celtiberi* (q.v.). The more common opinion, however, both ancient and modern, is, that the Celts were not equally aboriginal with the Iberi, but invaders from Gaul, who conquered the latter.

HISPANIO'LA [Little Spain]: see DOMINGO, SAN HAYTI.

HISPID, a. *hĭs'pĭd* [L. *hispĭdŭs*, bristly, rugged: F. *hispide*]: rough; having strong hairs or bristles.

HISS, n. *hĭs* [an imitative word: Piedm. *issé*, or *sissé*, to

hiss on a dog: W. *hust*, a low buzzing noise: It. *zitto*, a slight sound: Dan. *tys*, hush; *tysse*, to hush]: an expression of contempt or disapprobation like the continuous sound of the letter *s*, produced by driving breath between the tongue and the teeth; the noise made by a serpent or goose, or by escaping steam: V. to express contempt by hisses; to condemn by hissing. HISS'ING, imp.: N. the act or expression of. HISSED, pp. *hĭst*. HISS'INGLY, ad. *-lĭ*. HIST, int. *hĭst*, hush; silence.

HISSAR, *hĭs-sâr'*: capital of a dist. of that name in the Punjab, about 100 m. n.w. of Delhi. Pop. 17,000. The district of HISSAR', belonging to a division of the same name, is on the w. border of the great desert of Bikaner: it has 3,540 sq. m., and its fertile soil produces wheat and other cereals in abundance. Pop. 504,183. The British division of HISSAR has 8,478 sq. m.; pop. about 1,312,000.

HISTOGENESIS, n. *hĭs'tō-jĕn'ĕ-sĭs*, or HISTOG'ENY, n. *-tŏj'ĕ-nĭ* [Gr. *histos*, a tissue, a web; *gennăō*, I produce]: the microscopic study of tissues in animals or plants; the formation and development of organic tissues. HISTOGENETIC, a. *hĭs'tō-jĕnĕt'ĭk*, promoting the formation of organic tissues: in *bot.*, applied to minute molecules supposed to be concerned in the formation of cells.

HISTOID, a, *hĭs'toyd* [Gr. *histos*, tissue; *eidos*, form]: tissue-like; term applied to tumors whose contents closely resemble the normal texture of the body.

HISTOLOGY, n. *hĭs-tŏl'ŏ-jĭ* [Gr. *histos*, a tissue; *logos*, a discourse]: the science of the animal tissues; the description of the tissues which form an animal or plant. HIS'TOLOG'ICAL, a. *-lŏj'ĭ-kăl*, relating to histology or the description of tissues. *Histology* is the science which classifies and describes the structural or morphological elements in the solids and fluids of organized bodies. It is identical or nearly so with general minute anatomy and with microscopic anatomy. Although its origin may be traced to the times of Malpighi (1628–94), who discovered the blood corpuscles, and of Leeuwenhoek (1632–1723), who, with comparatively imperfect optical means, added much to the knowledge of the minute structure of the tissues, it never made any definite progress till the second decennium of the present century, when the compound microscope began to assume its present improved form. It was by this microscopico-chemical examination that the structure of the different horny tissues was first clearly exhibited, and it was thus proved that nails, cow's horn, and whalebone are similarly composed of aggregations of individual cells. Again, in the investigation of the nervous tissue, and of many other structures, chemistry and the microscope have most usefully combined.

During the last quarter of a century, no department of medical science has made such rapid progress as histology. In Germany, it has been successfully cultivated by Schwann, Hewle, Valentin, Remak, Kölliker,

Virchow, Leydig, Frey, and a host of others, scarcely less distinguished; in Holland, it has been actively prosecuted by Donders, Harting, and others; Lebert, Mandl, Robin, and others have contributed to the French literature of the subject; while of Englishmen, the names of Todd and Bowman, of Goodsir, Quekett, Bennett, Sharpey, Clarke, Wharton, Jones, Beale, and Huxley, deserve honorable notices. See CELL-THEORY; TISSUES.

Topographical histology considers the more minute structures of the organs and systems of the body; normal histology deals with the healthy tissues; and pathological histology investigates the changes they undergo in disease. It has been found that all structures however complex are made up of cells, and that the parts of a body, may be resolved into a smaller number of elementary tissues now grouped as: (1) epithelium, which lines almost all the cavities of the body and is directly or indirectly in communication witht he atmossphere; (2) the nervous tissues, which as nerve cells' originate and as nervous fibres transmit all nervous impulses; (3) muscle, which produces motion whether voluntary or involuntary; (4) glandular tissue which consists of cells standing in close relation with the blood-vessels wihch take from the blood certain substances and secrete them; (5) connective substances which support and hold together the more delicate and important structures, especially forming the cartilages and bones.

Vegetable histology is that department of botany which deals with microscopic phytotomy or the anatomy of plants, especially investigating the plant cells and plant tissues. It is properly subordinate to morphology and is a distinctively descriptive science.

HISTOLYSIS, n. *hĭs-tŏl'ĭ-sĭs* [Gr. *histos*, a web or tissue; *lusis*, a solution—from *lŭō*, I dissolve]: the disintegration of previously organized structures. HISTOLYTIC, a. *hĭs'tō-lĭt'ĭk*, derived from the disintegration of previously organized structures; of the nature of histolysis.

HISTORY, n. *hĭs'tŏ-rĭ* [Gr. and L. *histŏrĭă*, history: F. *histoire*]: a systematic account of facts and events, particularly those affecting nations or states; a narration of past events; or, in another sense of the term, the events themselves. HISTO'RIAN, n. *-tō'rĭ-ăn*, one who writes history. HISTOR'ICAL, a. *-tŏr'ĭ-kăl*, or HISTOR'IC, a. *-ĭk*, pertaining to history; contained in history or deduced from it. HISTOR'ICALLY, ad. *-kăl-lĭ*. HISTORIETTE, a. *hĭs-tō'rĭ-ĕt* [F. a story]: a short or little history. HISTORIFY, *v. hĭs-tŏr'ĭ-fī* [L. *făcĭō*, I make]: in Œ., to record or reduce to history. HISTOR'IFYING, imp. HISTOR'IFIED, pp. *fīd*. HIS'TORIOG'RAPHY, n. *-tō-rĭ-ŏg'ră-fĭ* [Gr. *graphō*, I write]: the art of employment of writing history. HIS'TORIOG'RAPHER, n. *-ră-fĕr*, one who; a person appointed by a sovereign to write the history of his kingdom. SACRED HISTORY, the history of religion and the events connected with it, as contained in the Scriptures. PROFANE HISTORY,

the history of nations in general, called also CIVIL HISTORY ANCIENT HISTORY, the history of the nations of antiquity down to the destruction of the Western Empire, 476 A.D. HISTORY OF THE MIDDLE AGES, extends from 476 A.D. to end of 15th century. MODERN HISTORY, from about 1492 A.D. to our own times. CLASSICAL HISTORY, the history of the Greeks and Romans. NATURAL HISTORY, a description and classification of the mineral, vegetable, and animal productions of the earth—sometimes limited to animals only. SYN. of history': annals: chronicles: a relation; narration; description; narrative; account; record; story

HISTORY. In a very broad sense history includes all that is known about the activities, however trivial, of mankind since the remotest times. Ordinarily, however, it confines itself to recording merely those facts that are significant in the progress of civilization, and, as only a comparatively few peoples have played an appreciable part in that progress, it devotes but little attention to the affairs of the other peoples. The first of the historic nations were the Egyptians and the Babylonians; next came the Assyrians, the Hebrews, and the Phœnicians; from the advent of the Greeks down to the settlement of America the chief historic peoples, if we except the Persians, the Arabs, and the Turks, have been inhabitants of Europe. Remote races like the Hindoos, the Chinese, and the Japanese have also developed civilizations, but their history is ordinarily studied in the West merely at those points where it touches upon or influences our own development. As previously stated, the history of Occidental civilization is divided into three periods—Ancient, Mediæval, and Modern; each of these periods has certain characteristics distinguishing it from the others, and the division is a useful and instructive one; but the fact should never be lost sight of that there is a unity or continuity in all history, and that the transition from one period to another is a gradual one comparable to that from youth to manhood or from manhood to old age.

The chief sources from which the materials used in writing history are obtained are (1) remains, such as statues, buildings, walls, roads, pictures, coins, medals, weapons, implements, and tombs; (2) documents, including official and business papers and letters; (3) literatures and languages; (4) traditions; (5) laws; (6) contemporary writings, such as diaries, journals, annals, chronicles, biographies, and other accounts. In interpreting these sources it is sometimes necessary to make use of certain auxiliary arts or sciences known as epigraphy, palæography, philology, diplomatic, history of literature, and archæology; while, before making use of the material thus brought to light, the historian must subject it to careful criticism in order to ascertain its exact significance, authenticity, and value. The comparatively modern discovery of certain monuments of great antiquity has vastly aided us in obtaining historical material bearing upon Ancient times. The Parian

Marble, brought to England from Smyrna by the Earl of Arundel, contains a chronological arrangement of important events in Grecian history from the earliest period to 355 B.C. The Assyrian Canon, discovered by Sir Henry Rawlinson, consists of a number of clay tablets, constructed during the reign of Sardanapalus, and containing a complete plan of Assyrian chronology; its authenticity is in part verified by the fact that it contains a record of a solar eclipse which we know occurred June 15, 763 B.C. The Fasti Capitolini, discovered at Rome, partly in 1547 and partly in 1817–18, contains in fragmentary records a list of Roman magistrates and triumphs from the beginning of the Roman Republic to the close of the reign of Augustus. Most famous of all the Rosetta Stone (q.v.), discovered by a French military engineer during Bonaparte's expedition to Egypt, contains inscriptions in the Greek and Egyptian languages, the deciphering of which has led to the discovery of a key to the meaning of the hieroglyphic inscriptions on the Egpytian monuments.

The writing of history, chiefly in the form of mere annals inscribed upon stone, papyrus, brick cylinders, etc., was practiced among the Egyptians, Babylonians, and other very ancient peoples, but the first historian who really deserves the name was Herodotus, a Greek of Halicarnassus, who has justly been termed 'The Father of History.' Herodotus lived in the 5th c. B.C., and recorded with accuracy and with a skill that has rarely been surpassed the events which fell within the range of his own observation, but he was credulous and mingled with his narrative many fabulous things which he had obtained from hearsay. The next important historian was Thucydides, the author of a work on the Peloponnesian war. He not only recorded events with remarkable conciseness and literary skill, but was also far more accurate in his investigations and was the first to apply philosophical reasoning in the construction of his narrative. Xenophon, the author of the celebrated *Anabasis*, also deserves a high place as a purely narrative historian, while to Polybius, another but later Greek, belongs the honor of being the first to undertake a universal history. Of the chief Roman historians, Cæsar and Livy confined themselves mainly to mere narration, but Tacitus was more philosophical and endeavored to discover the meaning underlying the sequence of events. With the decay of the empire historical writing also declined, and during a large part of the middle ages what attempts were made were almost entirely in the form of chronicles or annals and even these were ordinarily written by persons so credulous that their accounts can only be used with the greatest circumspection. Among those who in this period deserve honorable mention are the Venerable Bede, the celebrated church historian, Eginhard, who wrote a life of Charlemagne, Otto of Freising, Philip de Comines, and Froissart. With the broadening of the human intellect in the renais-

sance period the art of historical composition revived, and we find in Italy such historians as Macchiavelli and Guicciardini. In England somewhat later Sir Walter Raleigh attempted a history of the world, while half a century later the royalist statesman Clarendon wrote a history of the Puritan revolution. Among the English historians of the 18th c. were Hume, Robertson, and, above all, Gibbon, whose monumental history of *The Decline and Fall of the Roman Empire* still stands as the best work on that period. Of the writers on the Continent in the same century Montesquieu, the extraordinarily active and useful Voltaire, and the German ecclesiastical historian Mosheim deserve mention. It was in the 19th c. that most was done toward developing history into a systematic science, employing the modern critical methods. The great leaders in this movement were the Germans Niebuhr, Ranke, Curtius and Mommsen. An attempt in the same century was also made by certain philosophical thinkers but with less success to show that 'human actions are governed by laws as fixed and regular as those which rule in the physical world.' This theory is perhaps best set forth by Thomas Buckle in the first volume of his *History of Civilization in England*, published in 1857. Auguste Comte and Herbert Spencer were also members of this school. For a refutation of the theory the reader is referred to a lecture delivered by James Anthony Froude in 1864 on *The Science of History*, in which he seems to prove conclusively that the determination of human action upon any scientific basis is impossible. Among the great names in France during the century were Thiers, Guizot, Michelet, and the brothers Thierry, and in England those of the literary historians were Macaulay, Froude, and Carlyle, and the scientific historians Freeman, Stubbs, and Gardiner. Of the American historians whose work was done entirely in the 19th c. the chief was Bancroft, who has been called 'The Father of American Hisotry,' Prescott, Motley, John Fiske, Justin Winsor, and Francis Parkman. Of the American historians who are still living may be mentioned Henry Adams, Captain Mahan, John Bach McMaster, and James Ford Rhodes. Never before has there been such activity in the study and writing of history. The subject is taught in all colleges and universities, and also in the secondary and elementary schools; the output of historcal books is something prodigious; and in all important countries there are periodicals devoted to the subject. Among the most noteworthy of these are the *Revue Historique* in France, the *Historische Zeitschrift* in Germany, the *English Historical Review* in England, and the *American Historical Review* in America.

Despite the great interest shown in the subject, however, there is still wide difference of opinion regarding what history is and how it should be written. There are those who hold that it is a science and those who contend otherwise; those who insist that it possesses practical value to statesmen and to individuals, teaches moral and

other lessons, and those who maintain that it is rather unmoral than moral and is chiefly valuable as affording an explanation of the past, as assisting the social sciences, and as giving intellectual breadth and culture. There is even much dispute regarding the proper field of history. Some, following Freeman, would narrow it to politics merely; others to a study of institutions; while still others would have it include the whole sum of human activities. Attempts to formulate a philosophy of history are now out of fashion; even such theories as that which argues that history can be interpreted along economic lines has not met with general acceptance. Much, however, is being done to render the facts of history available, and when this work has progressed still further we may perhaps expect a new historical synthesis.

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Ancient History.—For an elementary sketch, Botsford, *Ancient History* (New York 1902); a philosophic view may be found in Andrews, *Brief Institutes of General History* (6th ed., Boston 1900); by far the best detailed work is Meyer, *Geschichte des Altertums* (I.-V., reaching to the middle of the 4th century B.C., Stuttgart and Berlin 1884–1902); for a satisfactory treatment of the period following this date it is necessary to depend on the histories of special countries and periods, for example, Holm, *History of Greece* (III., IV., translated from the German, New York 1896–8); Mommsen, *History of Rome* (translated from the German, 5 vols., conformed to the 8th ed., New York 1895); *Provinces of the Roman Empire*, 2 vols. (New York 1886); Duruy, *History of Rome* (8 vols., Boston), valuable for the imperial period; cf. also Duncker, *Geschichte des Altertums* (3d-6th ed., 9 vols., Leipsic 1874–86); 6 vols. translated by Abbott (London 1877–86); Oncken *Allgemeine Geschichte in Einzeldarstellungen*, by various authors (Berlin 1878–90); Helmholt, *History of the World* (Vols. I.-IV., New York 1902); Philippson, *Das Mittelmeergebiet: seine geographische und kulturelle Eigenart* (Leipsic 1904), valuable for physical environment; Cunningham, *Western Civilization in its Economic Aspects* (Cambridge 1898); Webster, *General History of Commerce* (Boston 1903); Perrot et Chipiez, *Histoire de l'Art dans l'Antiquité* (8 vols., Paris 1882–1903); for general tendencies, Freeman, *Chief Periods of European History* (New York 1886); especially fresh and suggestive are the articles by E. Meyer, Diels, Wilamowitz-Möllendorff, Soltau, and Hirschfeld in the *Historians' History of the World*, III.-VI. (New York and London 1904); the best encyclopedias for Greece and Rome, containing much information also regarding the Orient, are Daremberg et Saglio, *Dictionnaire des An-*

tiquités grecques et Romaines (3 vols. ready, Paris 1873–1904); Pauly-Wissowa, *Real-Encyclopädie der cl. Altertumswissenschaft* (4 vols. ready, Stuttgart 1894–1901); the best periodical is *Beiträge zur alten Geschichte*, edited by Lehmann (Leipsic 1901—); for bibliography past and current, *Jahresbericht über die Fortschritte der cl. Altertumswissenschaft*, including *Bibliotheca philol. cl.*, edited by Bursian (Berlin).

Mediæval History.—Lavisse et Rambaud, *Histoire Générale du IVe siècle à nos jours* (Paris 1893, ff.); Gibbon, *Decline and Fall of the Roman Empire* (edited by Bury, 7 volumes, London and New York 1896–1900); Milman, *History of Latin Christianity* (9 volumes, 1867). Of the many Church histories, two may be mentioned: Alzog, *Manual of Universal Church History* (3 volumes); Schaff, *History of the Christian Church* (4 volumes, to Gregory VII). Three volumes in the *Periods of European History;* Oman, *Dark Ages;* Tout, *Empire and Papacy;* Lodge, *Close of the Middle Ages* (New York 1893–1901), furnish a detailed, but somewhat uninteresting, summary of the political history. Hodgkin, *Italy and Her Invaders* (8 vols.), and Bury, *Later Roman Empire* (2 vols.), are the best guides for the periods before 800. Bryce, *Holy Roman Empire* (new ed. 1904; wonderfully compact and useful); Symonds, *Renaissance in Italy* (7 vols.); Burckhardt, *Civilization of the Italian Renaissance;* Voigt, *Wiederbelebung des classischen Alterthums* (2 vols., 3d edition); these works are to be commended for the period of the Renaissance. For special subjects: Montalembert, *Monks of the West* (6 vols.); Lea, *History of the Inquisition* (3 vols.); Oman, *History of the Art of War* (Vol. II.), for military matters; Heyd, *Geschichte des Levantehandels im Mittelalter* (2 vols.), very important for the commerce; Levasseur, *Histoire des classes ouvrières avant* 1789 (2 vols.), admirable for economic conditions; Gregorovius, *Rome in the Middle Ages* (8 vols.), very scholarly and interesting; Rashdall, *History of the Universities of Europe in the Middle Ages* (2 vols.), the best treatise on the subject; Saintsbury, *Flourishing of Romance*, the best brief account of the literature in the 12th and 13th centuries; Munro, *Syllabus of Mediæval History* (3d ed., 1903), contains references by topics to about 250 works, mainly in English.

Modern History.—Of co-operative 'series' the most important in English are: *The Cambridge Modern History*, edited by Ward (1903 et. seq.); and *Periods of European History*, edited by Hassall (1890–2, 8 vols., of which the last 5 belong to our period). Andrews' *Historical Development of Modern Europe* (1896), Fyffe's *Modern Europe to* 1878 (1884), and Seignobos *Europe Since* 1814 (1899) deal with the 19th century. Cunningham's *Western Civilization* (1900), and McVey's *Modern Industrialism* (1904) treat special phases. West's *Modern History* (a high-school manual, 1904) in an appendix gives a classified bibliography of 150 standard English works.

HISTRIONIC, a *hĭs'trĭ-ŏn'ĭk*, or His'trion'ical, a. *-ĭ-kăl* [L. *histrĭōnĭcus*, pertaining to stage-playing—from *histrĭōnem*, an actor or stage-player: F. *histrion*]: of or relating to the stage or stage-players; befitting the stage. His'trion'ically, ad. *-lĭ*. Histrionic art, the art of acting in the drama. His'trionism, n. *-izm*, stage-playing.

HIT, v. *hĭt* [Icel. *hitta*, to light on: Bav. *hutzen*, to strike: Dan. *hĭtte*, to hit upon]: to touch or strike with or without force; to touch, as a mark; to succeed; to chance luckily; to light on; in Œ., to agree; to suit: N. a stroke; a chance; a lucky chance; a happy conception. Hit'ting, imp. Hit, *hĭt*, pt. and pp. To hit off, to describe by characteristic strokes. To hit on or upon, to light upon, or come to, by chance. A great hit, an exceptional piece of good luck; a perfect success.

HIT, *hĭt* (anc. *Is*): town of Turkey in Asia, on the Euphrates, 90 m. w.n.w. of Bagdad. It has about 1,500 houses, and is remarkable for the fountains or pits of bitumen near it.

HITCH, n. *hĭch* [Bav. *hutschen*, to rock, to hitch one's self: Dut. *hutsen*, to shake, to jumble]: a catch, or anything which acts as one; a knot or noose in a rope (see Knot): a sudden stop or halt; an impediment: V. to hook, or catch by a hook; to catch; to move by jerks. Hitching, imp. Hitched, pp. *hĭcht*.

HITCHCOCK, *hĭch'kŏk*, Charles Henry, American geologist: b. Amherst, Mass., 1836, Aug. 23. He was son of Edward Hitchcock, geologist (q.v.). He was graduated from Amherst College in 1856, was assistant state geologist of Vermont in 1857–61, state geologist of Maine, 1861–2, and of New Hampshire 1868–78. In 1868 he was appointed professor of geology in Dartmouth College. In connection with his survey of New Hampshire, he maintained, during the winter of 1870, a meteorological station on Mount Washington, the earliest high-mountain observatory in the United States. He became known as a compiler of geological maps, and for his investigations regarding the geology of the crystalline schists, ichnology, and glacial geology. The location of the terminal glacier in the United States was first suggested by him. He was a founder of the Geological Society of America, and in 1883 president of the American Association for the Advancement of Science. His publications include: *Elementary Geology* (1861, with E. Hitchcock); *Mt. Washington in Winter* (1871); and a *Report on the Geology of New Hampshire* (1873–8), with folio atlas, his most valuable work.

HITCHCOCK, Edward, d.d., ll.d.: 1793, May 24—1864, Feb. 27; b. Deerfield, Mass.: Congl. minister, educator, and geologist. He educated himself while working on a farm; was principal of the Deerfield Acad., and made astronomical calculations, and published the *Country Almanac* 1815–18; graduated at Yale Theol. Seminary 1820; was pastor of the Congl. church, Conway, Mass., 1821–25, at the same time making a geological survey of w. Mass. and

studying chemistry; prof. of chemistry and natural history at Amherst College 1825–45; state geologist of Mass., 1830–44; pres. of Amherst College and prof. of natural theol. and geology 1845–54; state geologist of Vt. 1857–61, and held numerous other scientific appointments. He was a founder and first pres. of the Amer. Assoc. of Geologists and Naturalists 1840; an original member of the National Acad. of Sciences 1863; founder of the Hitchcock Ichnological Museum of Amherst College; a founder of the Mount Holyoke Seminary, and of the Mass. Agricultural College; and for many years a member of the Mass. Board of Agriculture. His character was notable for modesty, simplicity, and fidelity. He was a prolific author and frequent contributor to scientific and other periodicals, publishing among other works: *The Downfall of Bonaparte* (1815); *Economic Geology* (1832); *Report on the Geology, Mineralogy, Botany, and Zoology of Massachusetts* (1833); *Re-examination of the Economical Geology of Massachusetts* (1838); *Geology of Massachusetts* (1841), *Ichnology of New England* (1858), a supplement thereto, posthumous (1865), *Report on the Geology of Vermont, Theoretical, Economical, and Scenographical*, 2 vols. (1861); *Dyspepsia Forestalled and Resisted* (1830), *Elementary Geology* (1840), *Religious Lectures on Peculiar Phenomena of the Four Seasons* (1850), *Religion of Geology and its Connected Sciences* (1851), *The Power of Christian Benevolence illustrated in the Life and Labors of Mary Lyon* (1852), *Religious Truth illustrated from Science* (1857), and *Reminiscences of Amherst College* (1863). He received the degree D.D. from Middlebury College 1846, and LL.D. from Harvard Univ. 1840.

HITCHCOCK, *hĭch'kŏk*, ETHAN ALLEN: 1798, May 18—1870, Aug. 5; b. Vergennes, Vt.: soldier. He graduated at the U. S. Milit. Acad. 1817. became capt. 1824, was asst. instructor of milit. cadets at the acad. 1824–27, commandant of cadets there 1829–33, served through the Seminole Indian and Mexican wars, was inspector-gen. on Gen. Scott's staff, was brevetted col. for Contreras and Churubusco, and brig.gen. for Molino del Rey, promoted col. 2d U. S. inf. 1851, resigned his commission and engaged in literary pursuits 1855; was appointed maj.gen. of vols. 1862, Feb.; served as commissioner for the exchange of prisoners of war and commissary-gen. of prisoners, and was retired 1867, Oct.

HITCHCOCK, ETHAN ALLEN, American politician: b. Mobile, Ala., 1835, Sep. 19. He received a secondary education, was in mercantile business at St. Louis, Mo., in 1855–60, then went to China to enter a commission house, of which firm he became a partner in 1866. In 1872 he retired from business, in 1874 returned to the United States, and in 1874–97 was president of several manufacturing, mining, and railway companies. He was appointed envoy extraordinary and minister plenipotentiary to Russia in 1897, and in February 1898 ambassador extraordinary and minister plenipotentiary, the first ambassador accredited from the United States to the court

of Russia. In 1898 he was nominated and confirmed as secretary of the interior, an office he held till 1907, Mar. 4.

HITCHCOCK, James Ripley Wellman, American art critic: b. Fitchburg, Mass., 1857, July 3. He was graduated at Harvard in 1877, and was art critic of the New York *Tribune* 1882–90. He has written: *The Western Art Movement* (1885); *A Study of George Inness* (1885); *Madonnas by Old Masters* (1888); the text to photogravures; *The Future of Etching; Some American Painters in Water Colors; Etching in America; Notable Etchings by American Artists;* etc.

HITCH'COCK, Roswell Dwight, d.d., ll.d.: 1817, Aug. 15—1887, June 16; b. E. Machias, Me.: educator. He graduated at Amherst College 1836, taught school a year, entered Andover Theol. Seminary 1838, was tutor at Amherst College 1839–42, resident licentiate at Andover 1842–44, and was installed pastor of the 1st Congl. church at Waterville, Me., 1845, Nov. 19. He spent 1847–8 studying in the universities of Halle and Berlin, became Collins prof. of natural and revealed religion in Bowdoin College 1852, and Washburn prof. of church history in Union Theol. Seminary (Presb.) in New York 1855. In 1866 he visited Italy and Greece, and 1869–70 Egypt, Sinai, and Palestine; 1871 was elected pres. of the American Palestine Exploration Soc.; and 1880 pres. of Union Theol. Seminary, and vice-pres. of the American Geographical Soc. He was one of the editors of the *American Theological Review* 1863–70. Hitchcock published *Life of Edward Robinson* (1863); *Complete Analysis of the Bible* (1869); *Socialism* (1878); edited with Rev. Drs. Eddy and Schaff *Hymns and Songs of Praise* (1874) and *Hymns and Songs for Social and Sabbath Worship* (1875); and translated with Rev. Dr. Francis Brown *The Teaching of the Twelve Apostles* (1884–5).

HITHER, ad. *hĭth'ẽr* [AS. *hider, or hither;* Icel. *hedra;* Dan. *hid;* Goth. *hidre*, hither]: to this place: Adj. nearer. Hith'ermost, a. *-mōst*, nearest on this side. Hith'erto, ad. *-tô*, to this time or place; in any time before the present. Hither and thither, in several directions; backward and forward.

HITOPADE'SA [literally, 'good advice,' or 'salutary instruction,' from the Sanskrit *hita*, good, salutary; and *upadesa*, advice, instruction]: name of the celebrated Sanskrit collection of fables, the contents of which have passed into almost all the civilized literatures of the earth. The collection itself, in the form in which we possess it, is founded on older works of a kindred nature, and is classed by the Hindoos among their ethical works. See Sanskrit Literature.

HITTITES, *hĭt'tīts:* English name of the people called in the Old Testament *Khittim*, a Canaanitish people conquered by the Israelites, spoken of as the children of Heth, who was one of the sons of Canaan. The Palestinian Hittites are usually assumed to have been a branch of the

powerful and warlike nation called in Egyptian *Khita*, and in the Assyrian inscriptions *Khatti*, the centre of whose dominion lay in the regions between the Orontes and the Euphrates. This people, apparently of non-Semitic stock, long held their ground against the Assyrians, and were at one time the most formidable rivals of the Egyptians, but were ultimately (about B.C. 1340) conquered by the latter power. They seem to have sent armies into Asia Minor and to have left their traces even on the shores of the Ægean Sea, and to have stamped their influence on Babylonian and Assyrian art. The Hittite empire at its height of power doubtless extended from Carchemish, its capital on the Euphrates, to the central plateau of Asia Minor. Its decline corresponded to the rise of the Assyrian power. It has been held that the Hamathite inscriptions in the s.w. of Asia Minor are their work; and that the Cypriote syllabary is derived from the same source. The Hittite capital was Carchemish (modern Jerablûs): their chief southern city, Kadesh on the Orontes, was identified 1881 by the help of the Egyptian records.

HITZIG, *hĭt'sĭch*, FERDINAND: German biblical scholar: 1807, June 23—1875, Jan. 22; b. Hauingen, Baden. He was educated at Heidelberg, Halle—where the influence of Gesenius determined him in favor of Old Testament studies—and at Göttingen. In 1833, he was called to Zürich as prof. of theology, with a special view to the exegesis of the Old Testament; but his lectures embraced also the New Testament, and the languages of the East, especially the Semitic. In 1861, Hitzig returned as prof. to Heidelberg, where he died. His abilities as a philologist were very great, and he had much sagacity in criticism; but as a commentor he had some grave defects. The first work which established his fame was his *Uebersetzung u. Auslegung d. Proph. Jesaias* (1833). Besides a translation of the Psalms, with a commentary (1835–6), he furnished for the *Exegetisches Handbuch zum A. T.* the commentaries on the 12 minor prophets (1838; 2d ed. 1851), on Jeremiah (1841), Ezekiel (1847), Ecclesiastes (1847), Daniel (1850), and the Song of Solomon (1855), with a translation of all the prophetical books as a supplement (1854). He is known also by *Die Erfindung d. Alphabets* (1840), *Die Grabschrift d. Darius zu Naschki-Rustam* (1845), *Urgesch. u. Mythologie d. Philistäer* (1846), etc., and by considerable contributions to periodicals.

HIVE, n. *hīv* [Goth. *heiv;* Icel. *hiu;* family, household, AS. *hige*, a household]: a kind of box or basket in which the domestic bees store their honey; a swarm of bees; any company of persons numerous and industrious: V. to collect into a hive; to take shelter together; to reside together. HI'VING, imp. HIVED, pp. *hīvd.* HI'VER, n. one who. HIVE-NESTS, in *ornith.*, nests constructed by birds living in vast societies under one common roof. They are found only in Africa; the most remarkable being the work of the Republican Grosbeak (*Philœterus socius*), the nests of which

are constructed in such numbers in trees that the latter often break down with the weight.

HIVES, n. plu. *hīvz* [see HIVE]: witicaria; in England the term is sometimes synonymous with croup.

HIVITES, *hī'vīts* ['Midlanders' according to Ewald, or 'Villagers' according to Gesenius]: Canaanitish people, who in the time of Jacob occupied the uplands of Ephraim, and later, the slopes of Hermon and the region w. toward Tyre.

HIZZ, HIZZ'ING, *hĭz:* OE. spelling of HISS, HISSING.

H'LAS'SA: capital of Tibet, on the Dzangtsu, lat. 29° 39′ n., long. 91° e.; 11,910 ft. above sea-level. It is noted for the convents in and near it, composing the ecclesiastical establishments of the Dalai-lama, whose personal residence is in a convent on the adjacent Mount Botala. H'lassa is to Buddhism what Rome is to Rom. Catholicism; it is the headquarters of the hierarchy of lamas, who, by means of the Dalai-lama, exercise priestly control over nearly all Mongolia, as well as Tibet. The city lies in a fertile plain, which extends about 7 m. n. to s., and about 13 m. in length. Mountains and hills encircle it. A Chinese garden is quartered near Mount Botala, where the temples are of great interior magnificence. A British expedition invaded the long-maintained isolation of H'lassa in 1904, and compelled the Tibetans to ratify a commercial treaty. Pop. 50,000.

HO, or HOA, int. *hō* [F. *ho*, an int. to impose silence or stop an action: Icel, *ho'a*, to shout out ho!]: hold! stop! used to excite attention.

HOACTZIN, *hō'ăkt-zĭn*, or HOAZIN, *hō'a-zĭn*, or TOURACO, *tô-răk'ō* (*Opisthocomus cristatus*): tropical bird nearly as large as a peacock, which it somewhat resembles in its gait and manners; a native of Guiana and Brazil; referred by some naturalists to the family *Cracidæ* (with curassows and guans) and the gallinaceous order; by others regarded as of the order *Insessores*, and allied to the plantain-eaters; indeed the peculiarity of its anatomical structure, unique among birds, has given rise to great variety in the classification. Its anatomy is remarkable: it has an enormous crop, while the gizzard is very small. It has a harsh hissing note, and unpleasant odor, is gregarious, and frequents marshy situations.

HOAD'LEY, GEORGE: lawyer: b. New Haven, 1826, July 31; d. 1902. He graduated at Western Reserve College 1844, studied law at Harvard College, was admitted to the bar 1849, was elected judge of the superior court of Cincinnati 1851, and city solicitor 1855. He became judge of the new superior court 1858, twice declined appointment to the state supreme court, resigned his judgeship 1866, was elected governor of Ohio as a democrat 1883, and defeated 1885. He was professor in the Cincinnati Law School 1864–87, and in the latter year removed to New York to practice.

HOADLEYISM. See BANGORIAN CONTROVERSY.

HOADLEY, *hōd'lĭ*, BENJAMIN, D.D.: English prelate, 1676, Nov. 14—1761, Apr. 17; b. Westerham, Kent; second son of the Rev. Samuel Hoadley, master of the Norwich Grammar School. In 1691, he entered Catherine Hall, Univ. of Cambridge, where he became tutor after taking his degree M.A. In 1701, he was chosen lecturer of St. Mildred in the Poultry, London, and began to attract attention as a controversial writer. His *Reasonableness of Conformity to the Church of England* appeared 1703, which, like all his other performances, though agreeable to the sentiments of the educated laity of the Church of England, was exactly the reverse to the great body of the clergy, both established and dissenting. Next year, he obtained the rectory of St. Peter-le-Poor, London, and was soon engaged in a controversy with Dr. Atterbury (q.v.) on the extent of the obedience due to the civil power by ecclesiastics. This contest was conducted by Hoadley in such a way as to secure for him the applause of the house of commons, who, in their address to the queen (Anne), referred to his important services to the cause of civil and religious liberty. In 1710, Hoadley was presented to the rectory of Streatham, in Surrey; and 1715, when the accession of George I. had secured the triumph of whig principles, was made Bishop of Bangor; but it is affirmed he never visited the see, for fear of exciting a 'party fury.' He was, however, far from remaining idle. In 1717, he preached before the king a sermon on the text, 'My kingdom is not of this world,' in which he endeavored to show that Christ had not delegated his powers to any ecclesiastical authorities. He carried this idea to great length, and maintained that it was the best and safest ground in attempting to refute both Rom. Catholics and Dissenters. Hence originated the famous Bangorian Controversy, regarding which Hallam says, that is was 'managed, perhaps on both sides, with all the chicanery of polemical writers, and disgusting both from its tediousness, and from the manifest unwillingness of the disputants to speak ingenuously what they meant.' Hoadley's principal opponent was William Law. Hallam speaks of having read 40 or 50 pamphlets on the question. In 1721, Hoadley was transferred to the see of Hereford; 1723, to Salisbury; and 1734, to Winchester. In 1735, he published a *Plain Account of the Nature and End of the Lord's Supper;* and 1754–5, two vols. of sermons, which were highly esteemed.

HOANG-HO'. See HWANG-HO.

HOAR, a. *hōr* [AS. *har*, hoary; Icel. *hæra*, gray hair; *hærdr*, gray-haired; F. *haire*, a hair shirt]· white, as with frost or age; in OE., moldy; musty: V. in OE., to become moldy or musty. HOARY, a. *hōr'ĭ*, white or gray with age; grayish-white; thickly covered with short whitish hairs. HOAR'INESS, n. *-nĕs*, the state of being whitish or gray. HOAR-FROST, frozen dew or vapors on the surface of the ground; rime: see DEW.

HOAR, *hōr*, Ebenezer Rockwood, ll.d.: lawyer: b. Concord, Mass., 1816, Feb. 21; d. 1895, Jan. 31. He graduated at Harvard College 1835, was admitted to the bar 1840, was commonpleas judge 1849–55, state supreme judge 1859–69, U. S. attor-gen. 1869–70, member of the joint high commission (Geneva Arbitration) 1871, and representative in congress 1873–75.

HOAR, George Frisbie: ll.d., lawyer: b. Concord, Mass., 1826, Aug. 29; d. Worcester, Mass., 1904, Sep. 30. He graduated at Harvard College 1846, was admitted to the bar 1849, member of the state assembly 1852, senate 1857; representative in congress 1869–77, elected U. S. senator 1877, 83, 89, 95 and 1901, to republican national convention 1876, 80, 84, overseer of Harvard Univ. 1874–80, regent of the Smithsonian Institution 1880, trustee of the Peabody Museum of Archæology, member of the Mass. Hist. Soc., and pres. of the American Antiquarian Soc. He received the degree ll.d. from William and Mary and from Amherst Colleges, and Harvard and Yale Universities.

HOAR, Samuel, ll.d.: 1778, May 18—1856, Nov. 2; b. Lincoln, Mass.: statesman. He graduated at Harvard College 1802, was admitted to the bar 1805, settled in Concord, Mass. to practice, was member of the state constitutional convention 1820, state senate 1825–33, representative (whig) in congress 1835–37; commissioner of the Mass. legislature to that of S.C. to test the constitutionality of S. C. laws authorizing the imprisonment of free negroes there from other states, and was expelled from Charleston by order of the legislature 1844, Dec. 5. He was a member of the Mass. Hist. Soc., American Bible Soc., and the American Acad. of Arts and Sciences. He married a daughter of Roger Sherman, was father of Ebenezer Rockwood Hoar, and George Frisbie Hoar, and received the degree ll.d. from Harvard College 1838.

HOARD, n. *hōrd* [AS. *hord;* Goth. *huzd;* O.H.G. *hort;* Icel. *hodd*, treasure]: a store or stock of anything accumulated or laid up; a hidden stock; a treasure: V. to collect and lay up a quantity of anything; to amass or store up secretly. Hoard'ing, imp.: N. the habit or practice of secreting money or treasure. Hoard'ed, pp.

HOARD, n. *hōrd*, or Hoard'ing, n. [Dut. *horde*, a fence of branches; OF. *horde*, a palisade, a barrier: Ger. *hürde*. a frame of rods; *hürding*, a fence]: a timber fence inclosing builders while at work; a fence about any building while it is erecting or under repair.

HOARHOUND. See Horehound.

HOARINESS, HOARY. See under Hoar.

HOARSE, a. *hōrs* [AS. and Icel. *has;* Ger. *heiser;* Dut. *heesch*, hoarse]: having a rough grating voice, as from a cold. Hoarse'ly, ad. *-lĭ*. Hoarse'ness, n. *-nĕs*, harshness or roughness of voice or sound; unnatural asperity of voice. See Throat, Diseases of.

HOAX, n. *hōks* [AS. *hucx*, or *husc*, slight irony: really a corruption of *hocus*, in the phrase *hocus-pocus*, to play a trick on]: something done for deception; a deceptive trick; an imposition: V. to play a trick upon for sport; to deceive. HOAX'ING, imp. HOAXED, pp. *hōkst*.

HOAZIN. See HOACTZIN.

HOB, n. *hŏb*, or HUB, n. *hŭb* [connected with *hump*, an excrescence, which see: Ger. *heben*, to raise; *gehoben*, raised]: an excrescence or projection; the little cap in the centre of a wheel which covers the end of the axle; one of the two flat raised side-parts of a grate; the mark to be thrown at in quoits.

HOB, n. *hŏb* [Scot. *habble*, to stammer: Dut. *hobbelen*, to stammer, to jolt: Dan. *hob*, a heap: prov. Ger. *hoppeln*, to hop]: a country clown; a rustic. HOBBLE, v. *hŏb'l*, to walk lamely; to limp; to fasten loosely together the legs; to clog: N. an unequal limping walk. HOBBLING, imp. *hŏb'lĭng:* ADJ. walking with a halting step; limping. HOBBLED, pp. *hŏb'ld*. HOB'BLINGLY, ad. *-lĭ*. HOBGOB'LIN, n. *-gŏb'lĭn*, a clownish goblin; a frightful fairy. *Note.*—HOB, it appears, was also a popular corruption of the familiar name *Robin*, which fact accounts for one of its significations at least. Littré considers *hob* a mere pet corruption of *Robert*.

HOBART COLLEGE, founded 1822 at Geneva, N. Y., under the auspices of the Prot. Epis. Ch. was chartered in 1825 as Geneva College, but in 1852, the name was changed to Hobart Free School, and in 1860 to Hobart College, after Bishop Hobart (q.v.) who aided the school with money and advice. It also received an endowment from Trinity Church, New York. The annual income is $31,700; the property is valued at $676,900 including grounds and buildings, worth $167,500. There is a well-equipped library, a faculty of 20 professors and instructors, and an average annual enrollment of 150 students. Since its organization its graduates number nearly 1500. The courses lead to the degrees of A.B., B.S., and B.L., and scholarships and prizes are offered to worthy students. All U. S. Prot. Epis. bishops are *ex officio* regents; the States bishops are visitors; and the bishop of the local diocese and the president of the College are members of the board of trustees.

HOBART, *hō'bĕrt* (till 1881, known as HOBART TOWN): capital of Tasmania, on the noble estuary of the Derwent, in the south of the island, named from Lord Hobart, colonial sec. The mean temperature for 35 years was 55.41° Fahr., and the climate is admirable for invalids. Hobart came under municipal govt. 1853. Besides the government official buildings Hobart has a college and seven public and numerous private schools, more than 30 churches, and two cathedrals; and its naturally excellent harbor and fine quay accomodate ships of the largest size Tasmanian ships trade between Hobart and London. Hobart has railway communication with Launceston. Pop. 31,300.

HOBART, Garrett Augustus: lawyer, statesman: 1844, June 3—1899. Nov. 2; b. Long Branch, N. J.; of mingled New England and colonial Dutch descent. He graduated from Rutgers Coll. 1863, taught school for a while, then studied law in Paterson, N. J.; was admitted to the bar 1866, and began practice in that city. Though he had a vast number of legal cases put in his hands, he appeared in court with remarkable infrequency, his plan being to arrange settlements of disputes privately. He was director in at least 60 different companies, pres. of Paterson Railway Co.; which owns the trolley lines, and of the City Water Co.; besides he held interests in various manufactories and railroads. At the age of 30 he was a member of the legislature; was speaker of the house; afterward a member of the state senate and for two terms its pres. He was always an earnest republican, but was noted for justice and magnanimity to his political rivals. The national convention of the republican party 1896 nominated him for vice-pres. on a platform embodying protection, and declaring against free-silver coinage and in favor of maintaining the existing gold standard, and he was elected.

HOBART, George Vere, American journalist, playwright, and author: b. Cape Breton, N. S., 1867, Jan. 16. He was educated in Nova Scotia, later coming to the United States as a telegraph operator for the United Press. He became editor of the Cumberland Sunday *Scimitar*, later writing for the *Herald*, *Evening News* and *American* of Baltimore. Since then he has been writing for the Hearst newspapers the humorous sketches, *John-Henry* and *Dinkelspiel*. He has written *Many Moods and Many Meters* (1899), and *Li'l Verses for L'il Fellers* (1903), both poems; the *Dinkelspiel* series (1900); the *John-Henry books* (1901–4), and the plays, *After Office Hours*, *Miss Print*, *Hodge, Podge & Co.*, *Sally in our Alley*, etc.

HOBART, John Henry, s.t.d.: 1775, Sep. 14—1830, Sep. 12; b. Philadelphia: bp. of the Prot. Epis. Church. He graduated at the College of N. J. 1793, was tutor there 1796–98, was ordained deacon in the Prot. Epis. Church 1798, priest 1801, rector of Christ Church, New Brunswick, N. J., 1790, and of St. George's Church, Hempstead, L.I. 1800; assistant minister of Trinity Church, New York, 1800; assistant rector there 1812, and rector 1816; and was elected assistant bishop of New York 1811, and bishop 1816. He was a founder of the General Theol. Seminary in New York, and became professor of pastoral theol. and pulpit eloquence there 1821. His published works include *Companion for the Altar* (1804), *Festivals and Fasts* (1804), *Companion to the Book of Common Prayer* (1805); *Clergyman's Companion* (1805); *Apology for Apostolic Order* (1807); *The Christian Manual* (1814); *Essay on the State of the Departed* (1814), an edition of D'Oyley and Mant's family Bible, 2 vols. (1818–20), and numerous sermons.

HOBART-PASHA, *hō'bĕrt-pâ-shâ'* (AUGUSTUS CHARLES HOBART): naval officer: 1822, Apr. 1—1886, June 19; b. England; son of the Earl of Buckingham. He entered the British navy 1836, distinguished himself as midshipman on the expedition to suppress the slave trade in Brazilian waters, was appointed lieut. on the queen's yacht, as capt. commanded H. M. S. *Driver* in the Crimean war, and during the American civil war commanded the Confederate blockade-runner *Don*, and was promoted post-capt. in the British navy. In 1867, on the outbreak of the Cretan insurrection, he entered the Turkish service, and commanded the fleet that blockaded the Greek ports. For his services in averting a general European war he was decorated by Turkey, France, and Austria; but his own country struck his name from its naval list for engaging in foreign service without permission. After long negotiations he was restored, but remained in the Turkish service and became admiral of the Turkish navy, commander of the Black Sea fleet in the Russo-Turkish war 1874, and marshal of the empire 1881. He was author of *Sketches from My Life* (posthumous 1887).

HOBBEMA, *hŏb'bē-mâ*, MEYNDERT, or MINDERHOUT, or MINARD: about 1638–1709, Dec. 14; b. Holland: painter. All accounts of his personal career are lost excepting the record of his grand landscapes, for which he has been placed on a par with Ruysdael. He delighted in forests and ruins, and like Jan van der Heyden (q.v.), had his figures painted by other artists, notedly Berghem, Van der Velde, Lingelbach, and Van Loo. Those that are considered his best paintings are dated 1663–67, but many of his dates are deemed erroneous; they certainly are at variance with the accepted dates of his career. His works were long unappreciated, but one of them—a watermill—was bought for the Antwerp Museum 1876 for $20,000, and a smaller one was afterward sold to an English gallery for $21,500. Others of his works are found in the Brussels, St. Petersburg, Grosvenor, the Louvre, and Vienna galleries, and in several English and Dutch collections.

HOBBES, *hŏbz*, THOMAS: 1588, Apr. 5—1679, Sep. 4; b. Malmesbury, England; son of a clergyman of that town. At the age of 14, he went to Oxford, and passed through the usual course of Aristotelian logic and physics. His instructions in the syllogism he afterward held in small estimation. At the age of 20, having taken his degree and quitted Oxford, he was recommended to Lord Hardwicke, afterward Earl of Devonshire, as tutor to his eldest son, this being the commencement of an intimate connection with that great family which lasted through his long life.

In 1610, with his pupil, he made the tour of France and Italy After his return, he lived with the Devonshire family, and his residence in London afforded him opportunities of becoming acquainted with Bacon, Raleigh, Ben Jonson, and other distinguished men of the time. Meantime, he was occupied with his classical, political, and

philosophical studies, and prepared for publication his first work, a translation of Thucydides, published 1628.

The Earl of Devonshire having died 1626, and the young earl, Hobbes's pupil, 1628, Hobbes was in great grief, and took an opportunity of going abroad with the son of Sir Gervase Clifton, and remained some time in France. In 1631, however, his connection with the Devonshire family was resumed. By the desire of the dowager-countess, he undertook the education of the young earl, then 13 years old, son of the former pupil. He was in Paris 1634–37. He seems then to have applied himself to the composition of his first original work, entitled *Elementa Philosophica de Cive*, printed Paris 1642; his first exposition of his moral and political philosophy. He published soon afterward two small treatises, *Human Nature*, and *De Corpore Politico*. The first contains his views as to the constitution of the mind, and entitles him to be considered the father of modern systematic psychology. Although the work is valuable in itself, he considers it a prelude to the other treatise, *De Corpore Politico*, on the nature of society, a subject here handled for the second time by him, and in much the same strain. He goes over the whole ground a third time in the *Leviathan*, 1651, the fullest and perhaps the best known exposition of his views on mind, politics, morals, and religion. Here he contends as before in favor of pure monarchy, which he represents to have grown out of a primitive contract made by the people with one another from the desire to escape from all the evils of a state of nature, which is a state of war. He is far from justifying tyranny; on the contrary, he enjoins upon the monarch a government according to just laws, and considers that this is more likely to be obtained by the government of a single person, whose selfish aims must be sooner satiated than if the supreme power were distributed in a number of hands. At the same time, since the sovereign was not himself one of the parties to this contract, Hobbes gives the people no recourse against him, should he abuse the powers which they have absolutely and irrevocably intrusted to him.

After the meeting of the Long Parliament 1640, he had returned to Paris, from his dread of the civil troubles. In 1647, he was appointed mathematical tutor to the Prince of Wales, afterward Charles II., and stood high in the esteem of that prince; but the obnoxious character of his writings, especially after the publication of the *Leviathan*, so offended the royalist clergy, in common with all other sects, that Charles was induced to part with him; and he himself, being constitutionally timid, took the alarm for his personal safety, and abruptly fled from Paris to England. In England, he found himself safe, the Puritan government according him ample toleration. Very different was his position after the 'glorious' restoration of his own friends; for though Charles granted him a pension of £100 a year, the dislike to his views was so general that they were condemned by parliament 1666, and he was in danger of still severer measures. Although at first it seems strange

that though he defended the Stuarts, he was disliked by the royalists, while the Puritans tolerated him, the reason for this is not far to seek. He did not defend the divine right of kings, on which the Stuarts based their claim, but maintained that they were entitled to the throne by virtue of a primitive contract. And, while, to be sure, he said that the contract was perpetually binding upon the people, yet to regard it as a revocable contract would have involved only a slight alteration of his doctrine, and the Stuarts did not care to sanction a theory which gave so fragile a support to their contentions. His connection with the Earl of Devonshire, with whom he lived in the latter part of his life, was no doubt a powerful protection to him. His old age was fruitful in additions to his writings, and was marked by some sharp controversies. His last works were a translation of *Homer*, and a *History of the Civil Wars*—Hobbes has been called the second great English deist, Herbert of Cherbury being the first. It has been said that he gave 'the first clear exposition and defense of the *psychological* doctrine of determinism.'

HOBBLEDEHOY, n. *hŏb'l-dĕ-hoy* [comp. Gael. *abartachoige*, an unmanageable youth]: a youth not yet come to man's estate.

HOBBY, n. *hŏb'bĭ*, or HOBBY-HORSE [Ger. *hoppe*, a mare: OF. *hobin*, a little ambling horse: Fris. *hoppe*, a horse, in nursery language]: a little, strong, active horse; a nag, a stick across which young boys place themselves in play; a wooden horse on which children ride; a pasteboard representation of a horse fastened to a man, who appears then to be riding on horseback; the favorite object or pursuit of any one. HOBBLER, n. *hŏb'lĕr* [O.F. *hobiler*]: in OE., one who served as a soldier on a *hobby* in light armor.

HOBBY, n. *hŏb'bĭ* [F. *hobereau*, a hobby—from OF. *hobe*, a small bird of prey] (*Falco subbuteo*): small species of falcon, native of most parts of Europe, and of many parts of Asia and Africa. It is in utmost length about 12 inches. It is grayish-black or bluish-gray on the upper parts, each feather edged with yellowish-white, and the whole form very elegant. The hobby was often used in falconry, and trained to fly at pigeons and partridges.

HOBGOBLIN, HOBBLING. See under HOB.

HOB'HOUSE, JOHN CAM. See BROUGHTON, LORD.

HOBKIRK'S *hŏb'kĕrks*, HILL, BATTLE OF, in the Revolution, 1781, April 25. After Guilford Court-house, Greene marched toward the British position at Camden under Rawdon, and encamped at Hobkirk's Hill, about 1½ miles north. He had 940 men in line, prudently encamping in order of battle; and some militia just arrived who took no part in the battle. His trains and artillery had not come up, and a renegade drummer boy informing Rawdon of this, the latter took 960 men, and making a detour to the right through the woods in front of Greene, drove in Greene's pickets with so sudden an onslaught that the Americans had barely time to form. Greene

ordered the First Maryland to charge bayonets and William Washington to take the British in the rear with his cavalry, while Ford and Campbell executed flanking movements on Rawdon's wings. But Ford was killed, one of the First Maryland's captains was shot, the men fell into disorder and Col. Gunby ordered the regiment to form on the rear companies instead of moving the latter forward; the retiring men were seized with a panic, the famous veterans broke, and though soon re-formed, the position was dangerous and Greene had to retreat. Gunby was court-martialed, but acquitted of anything but grave misjudgment. Greene's loss was 135, besides missing militia; Rawdon's 220 (his own figure) or 258 (Tarleton's).

HOB-NAILS, n. *hŏb'nālz* [Ger. *hufnagel*, a hoof-nail]: the nails with big heads set in the thick soles of a country shoe; the nails of a horse-shoe.

HOBNOB, v. *hŏb'nŏb*, or HOB-A-NOB, v. *hŏb'ă-nŏb'* [AS. *habban*, to have, and *nabban.*, to have not]: to take it or leave it; at a *social meeting*, a friendly invitation to reciprocal drinking. HOBNOB'BING, imp. HOBNOBBED', pt. and pp. *-nŏbd'*.

HOBOKEN, *hō-bō'kĕn:* city in Hudson co., N. J., on the Hudson river and the Del. Lackawanna and W. railroad; adjoining Jersey City, N. J., and opposite New York. It is the starting point of several lines of European steamships, has ferryboat connections with New York and street car with Jersey City and northern suburban villages, is well paved and drained, has gas and electric lights and good police and fire systems, and is a popular place of residence for German-Americans. Above it and ½ m. from the river rises the s. extremity of the Palisades of the Hudson, on which are Castle Point, the old mansion and grounds of the late Edwin A. Stevens, and the institute founded by him. Near by is the site of the 'Elysian Fields,' a popular resort for New Yorkers of former days and a noted duelling ground; and a cave that has been variously associated with the still unsolved mystery of the disappearance of Mary Rogers, the pretty New York tobacco-girl, 30 years ago. The river front of Hoboken is lined with wharves, and there are numerous commodious warehouses, including two bonded ones of the federal govt. Hoboken is also a noted coal shipping point; and the coal, steamship and railroad interests form its chief industries, though a large business is done in the manufacture of lead pencils, machinery, steam-engines, and beer. Its principal buildings are the Stevens Institute of Technology of world-wide fame, founded by Edwin A. Stevens, who gave the site, $150,000 for buildings and $500,000 for endowment, and opened 1871; the monastery of the Passionate Fathers (Rom. Cath.); Martha Institute; St. Mary's hospital; Sacred Heart academy; fine churches; and graded schools. Hoboken variously said to be named from Hoboken, a Belgian village near Antwerp, from the Indian *Hopoghan* and *Hobocan Hacking*, the last signifying "land of the

tobacco-pipe" so called from the native pipes made of a stone found in the vicinity; was settled by the Dutch about 1840. Pop. (1910) 70,324.

HOB'SON, *hŏb'sŭn*, JOHN ATKINSON, English social economist: b. Derby, England, 1858, July 6. He was graduated at Oxford University, and from 1887 to 1897 taught English literature and economics for the University Extension Delegacy, and the London Society for the Extension of University teaching. He is one of the foremost of economic writers in England and, as a socialist, advocates the monopolistic control of industries by government, whether municipal, or national. Among his works are *The Physiology of Industry: Being an Exposure of Certain Fallacies in Existing Theories of Economics* (with A. F. Mummery, 1889); *The Evolution of Modern Capitalism* (1894); *The Social Problem: Life and Work* (1901); *Imperialism* (1902); *International Trade* (1904); etc.

HOBSON, RICHMOND PEARSON: naval officer: b. 1870, Aug. 17, at Magnolia Grove, Ala. He graduated from the Naval Academy at Annapolis at the head of the class of 1889 and won distinction in the study of naval construction in France. In 1891 Hobson was made assistant naval constructor, and served in the Naval Intelligence Department and the Bureau of Construction and Repair. In 1894 he was assigned to the Brooklyn Navy Yard, and later to the flag-ship *New York*. He inaugurated the system of sea duty for constructors, and also proposed, organized, and conducted a post-graduate course at the U. S. Naval Academy. During the SPANISH-AMERICAN WAR (q.v.) Hobson on June 3, 1898, with seven companions, sailed into the mouth of the harbor of Santiago on the steam-collier *Merrimac* to sink the vessel under the batteries of Morro Castle and "bottling up" the Spanish fleet under Admiral Cevera in the harbor. The *Merrimac* was sunk, but in sinking veered out of the position she was intended to occupy. Hobson and his companions were taken prisoners by the Spaniards and exchanged on July 6. Hobson was promoted captain; commanded the salvage operations of Spanish ships in West Indian and Philippine waters; resigned from the navy in 1903 owing to impaired eyesight; engaged in writing and lecturing on naval affairs, and was subsequently elected to congress.

HOBSON'S CHOICE, *hŏb'snz:* that or none; no alternative. *Note.*—In time of King Charles I. Hobson was an innkeeper of Cambridge, and hirer of horses, whose large stud was hired out to travellers in strict rotation, and no choice or selection was permitted.

HOCHE, *ōsh*, LAZARE 1768, June 25—1797, Sep. 18; b. Montreuil, a faubourg of Versailles: eminent general of the French republic. In 1785, he entered the army, rapidly obtained promotion, and was raised, 1793, to the command of the army of the Moselle. Here he was opposed to the Duke of Brunswick, commander of the Prussian army, and was by him repeatedly defeated. He was more

successful against the Austrians, whom he drove out of Alsace. His next important service was putting an end to the civil war in La Vendée. 1797, Apr. 18, he crossed the Rhine at Neuwied, and had defeated the Austrians in several battles, when his career was stopped by the armistice between the Archduke Charles and Bonaparte at Leoben.

HOCHKIRCH, *hōch'kĭrch*, or HOCHKIRCHEN, *hoch'-kĭrch-ĕn:* village in the dist. of Bautzen, Saxony; scene of a battle between the Austrians and Prussians (1758, Oct. 14) during the Seven Years' War. Frederick II. of Prussia, with an army of 30,000 strong, having taken up an almost untenable position at Hochkirch, was attacked, under cover of a thick fog, by Marshal Daun, with 50,000 Austrians, and compelled to retire to the heights of Dresa. Here he was again attacked by the Duke of Aremberg, and after a conflict of five hours' duration, again retired. He lost 9,000 men killed and wounded, and 101 cannons. He himself, and almost all his generals, were wounded. The Austrians lost 8,000 men. 1813, May 21, a battle took place here between the French and allies. See BAUTZEN.

HOCH'STADT: see BLENHEIM.

HOCK, or HOUGH, n. *hŏk* [AS. *hoh*, the heel, the ham: AS. *hoh-sin;* Icel. *hásinn*, the hock-sinew, the hamstring: Ger. *hakse*, the foot-joint of the hind leg of a horse; *hacke*, the heel]: middle joint of hind leg, which is really the heel; *hough* is used in same sense, but signifies properly the back of the knee: V. to cut the hamstring. HOCK'ING, imp. HOCKED, pp. *hŏkt.*

HOCK, n. *hŏk* [*Hochheim* (q.v.) in Germany]: Rhenish wine.

HOCKEY, n. *hŏk'ĭ*, or HOOKEY, n. *hŭk'ĭ* probably so named because played with *hooked-* or curved-headed sticks]: a game played with a ball and a club with a curve at one end; the game in *Scot.* is called *shinty.*

HOCKING, *hŏk'ĭng* (or HOCKHOCKING) RIVER: in O.; rising in Fairfield co., flowing s.e. through Hocking co., and joining the O. river in Athens co., after a course of 80 m., which traverses the rich O. coal field. It gives little facilities for navigation. The chief towns on its banks are Lancaster, Nelsonville, Logan, and Athens.

HOCUS, v. *hō'kŭs* [Dut. *hokus-bokus;* F. *hoccus-bocus*, the Latinized gibberish repeated by jugglers: perhaps connected with *Ochus-Bochus*, a magician and demon of the northern mythology]: to cheat or trick; to put a trick upon. HO'CUSSING, imp. HO'CUSSED, pp. *-kŭst*, vulgarly said of liquor in which some narcotic has been put. HO'CUS-PO'CUS, a *-pō'kŭs*, a juggler's trick: V. to put a trick upon one. *Note.*—HOCUS-POCUS is said to be the vulgar pronunciation of '*hoc est corpus meum*, "this is my body'—the form of Latin words pronounced over the wafers by a priest of the Rom. Cath. church. in order to their transubstantiation; the mumbling way in which the wordsweie often pro-

nounced appearing to the vulgar ear as *hocus-pocus.* The phrase arose during the Reformation excitement, which may account for its being used in the degrading sense of 'the gibberish of jugglers,' and 'gibberish in general'—see elder Disraeli.

HOD, n. *hŏd* [F. *hotte,* a basket carried on the back: Ger. *hotte,* a basket in which grapes are gathered: Scot. *hot,* a small heap]: an open wooden box fitted with a handle, in which laborers carry mortar or bricks on their shoulders. HOD'MAN, n. a bricklayer's laborer; at *Oxford,* a slang term for a young scholar from Westminster School admitted to Christ Church College.

HODDEN-GRAY, n. *hŏd'n-grā* [probably connected with *hoiden,* an ill-bred clownish wench, a rustic]: a coarse cloth made of undyed wool.

HODGE, *hŏj,* ARCHIBALD ALEXANDER, D.D., LL.D.: Presb. clergyman: 1823, July 18—1886, Nov. 11; b. Princeton, N. J.; son of CHARLES HODGE, D.D., LL.D. He graduated at the college of N. J. 1841, and the Princeton Theol. Seminary 1847; was missionary in India 1847–50; pastor at Lower West Nottingham, Md., 1851–55; Fredericksburg, Va., 1855–61, and Wilkesbarre, Penn., 1861–64; prof. of didactic theol. in Western Theol. Seminary, Allegheny, Penn.; also pastor of a church there 1864–77; associate prof. of didactic and polemic theol. at Princeton 1877; succeeded his father as full prof. 1878. He was author of *Outlines of Theology* (1860), *The Atonement* (1867), *Commentary on the Confession of Faith* (1869), *Life of Charles Hodge* (1880), and *Manual of Forms* (1883). He received the degree D.D. from the College of N. J. 1862, and LL.D. from Wooster Univ., O., 1876. Dr. Hodge was a man of close logical thought and great simplicity and modesty.

HODGE, *hŏj,* CHARLES, D.D., LL.D.; 1797, Dec. 28—1878, June 19; b. Philadelphia: Presb. theologian. He graduated at Princeton College 1815, and 1822 became prof. of oriental and biblical literature in Princeton Theol. Sem.; 1826–28 he studied in Paris, Halle, and Berlin. In 1840, he was transferred to the chair of theology, and held this position till the close of his life. He was founder and long the editor of the *Princeton Review;* and besides more than 130 essays, etc.; he was author of Commentaries on Romans, Corinthians, and Ephesians, on a work on the history of the Presb. Church in America (1840), of a criticism of Darwinism (1874), and of the well-known *Systematic Theology* (3 vols. 1872), now a standard work of the Calvinistic churches. Hodge had much gentleness of spirit, combined with fervent convictions, logical clearness,and great vigor in controversy. His influence was and is wide and deep on the opinion and movements of his denomination; and his great work, *Systematic Theology,* is undoubtedly the best modern exposition of Calvinistic doctrine.

HODGE, FREDERICK WEBB, American ethnologist: b. Plymouth, England, 1864, Oct. 28. He was brought to

this country at the age of seven years, and was educated at Washington, D. C. In 1884 he received appointment to the United States Geological Survey, in 1886 became secretary of the Southern Archæological Expedition, and in 1889, was appointed to the Bureau of Ethnology, Smithsonian Institution. He has written various papers on the Indians of the southwest.

HODGE, JOHN ASPINWALL, American Presbyterian theologian: b. Philadelphia, Pa., 1831, Aug. 12; d. 1901. He was graduated from the University of Pennsylvania (1851) and from Princeton Theological Seminary (1856). After 35 years of pastoral work he was appointed in 1893 professor of biblical instruction and church polity in Lincoln University. Among his works are *What is Presbyterian Law* (1882); *Theology of the Shorter Catechism* (1888); *The Ruling Elder at Work* (1897).

HODGE-PODGE, n. *hŏj-pŏj*, or HOTCH-POTCH, n. *hŏch-pŏch* [Dut. *hutspot;* F. *hochepot*—from prov. F. *hach'-poter*, to hack, to cut to bits]: a mixed mass, or a medley of ingredients; a soup with a large variety of vegetables.

HODGES, GEORGE, American Episcopal clergyman: b. Rome, N. Y., 1856, Oct. 6. He was graduated from Hamilton College, Clinton, N. Y., in 1877, and from the Berkeley Divinity School, Middletown, Conn., in 1881. He was assistant rector of Cavalry Church, Pittsburg, Pa., 1881–9, and rector 1889–94, in the year last named becoming dean of the Episcopal Theological School in Cambridge, Mass. He has published among other works: *Christianity Between Sundays* (1892); *The Heresy of Cain* (1894); *In the Present World* (1896); *Faith and Social Service* (1896); *The Battles of Peace* (1897); *The Path of Life* (1897); *William Penn* (1900); *Fountains Abbey* (1904); *The Human Nature of the Saints* (1904); *When the King Came* (1904); *The Cross and Passion* (1904); etc. He is one of the most prominent members of the Low Broad Church School in the Episcopal Church.

HODGETTS, *hŏj'ĕts*, EDWARD ARTHUR BRAYLEY, English journalist: b. Berlin, Germany, 1859, June 12. He has been connected with several influential London journals in the capacity of correspondent and was foreign editor of the New York *World* in 1894. Among his published books are *Liquid Fuel* (1890); *Round About Armenia* (1896); *A Russian Wild Flower* (1897); a translation of *The Swiss Family Robinson* (1897); etc.

HODGKIN, *hŏj'kĭn*, THOMAS, English historian and banker: b. Tottenham, Middlesex, 1831, July 29. He has been for many years the senior partner in a banking firm at Newcastle-on-Tyne, but since 1874 has given his time to historical writing. He has published *Italy and her Invaders*, a work of much importance, of which eight volumes have already appeared (1880–99); *Dynasty of Theodosius* (1889); *Life of George Fox* (1896); *Life of Charles the Great* (1897); etc.

HODGKIN'S DISEASE: disease of the lymphatic system and blood-making organs. The chief characteristics are enlargement of the lymph glands, usually also of the spleen, and the presence of nodules of adenoid or lymphoid tissue in various organs and tissues of the body; the bone marrow is usually changed in character similar to what is found in pernicious anemia. The disease generally begins insidiously and progresses slowly. The anemia is, as a rule, the first thing that attracts attention to the patient's condition, though he will probably have noticed before this time the enlargement of the glands in the neck or elsewhere at the surface of the body. Examination discloses an enlargement of the spleen. As the disease progresses the patient loses strength and flesh, becomes cachetic, has fever of an irregular type, and there is more or less boggy swelling (edema) of the feet and under the eyes. The disease often progresses steadily to a fatal issue, yet recovery has followed careful treatment. The drug which has been found curative in certain cases is arsenic. The food should be of the most nutritious and digestible character. Rest, at least the avoidance of fatigue —and these patients tire after very slight exertion—is necessary. In certain cases when the spleen seems to be specially affected removal of the diseased organ has been followed by recovery.

HODGKINSON, *hŏj'kĭn-son*, EATON: 1789, Feb. 26—1861, June 18; b. Anderton, near Norwich, Cheshire, England: prof. of the mechanics of engineering in University College, London, and the chief authority on the application of iron to architecture and engineering. At the age of 21 he settled in Manchester. At this time the principal authority on iron beams was Tredgold (q.v.), but his theories were overturned by Hodgkinson. Hodgkinson made a series of 227 experiments on the strength of pillars, generally in conjunction with Sir William Fairbairn (q.v.). For his important experiments and calculations, and general co-operation in the construction of the Britannia Bridge, he received a first-class medal at Paris 1855. His investigations are in *Transactions* of the British Asso. and the Memoirs of the Manchester Society. He also edited *Tredgold on the Strength of Cast Iron*, adding his own theories (1842–46). Hodgkinson died near Manchester. See STRENGTH OF MATERIALS: TUBULAR BRIDGES.

HODJA, n. *hŏd'ja* [Per. *khavadje*, a reader]: professor in a secondary school attached to a Mosque in Turkey.

HODOGRAPH, n. *hŏd'o-grăf* [Gr. *hodos*, a road; *graphō*, I write, I describe, I draw]: in *math.*, a curve originated by Sir W. Hamilton, used to illustrate the theory of central forces.

HODOMETER, *ho-dŏm'ĕt-er:* instrument for measuring the distance travelled by any vehicle: usually spelled ODOMETER (q.v.). HODOMETRICAL, a. *hŏd-o-mĕt'rĭk-al*, of or pertaining to a hodometer; in *naut.*, applied to the method of finding the longitude at sea by dead reckoning.

HOE, n. *hō* [F. *houe*, a hoe; *houer*, to dig up: Ger. *haue*, a hoe: Dut. *houwer*, to pick or hoe—from *houwen*, to new]: a common garden or field tool. V. to dig or cleanse with a hoe; to clean from weeds. HOEING, imp.: N. the clearing or digging with a hoe. HOED, pp. *hōd*.—The *Hoe* is an implement of gardening and of agriculture used for stirring the soil; drawing up earth to plants, thinning plants in drills, clearing the ground of weeds, etc. The many forms, all may be referred to two classes—*draw-hoes* and *thrust-hoes*, the former having the blade almost at right angles to the handle; the latter almost in the same plane with it. The thrust-hoe, or *Dutch Hoe*, is used chiefly for killing weeds, and for stirring ground to a slight depth. The draw-hoe, although much used as an implement of gardening, is in some countries scarcely used in agriculture except for thinning (*singling*) of turnips, in which it is always employed. But in some countries it is extensively used in place of the spade. In some parts of the W. Indies almost all the tillage of the ground is done by the hoe. It is more adapted than the spade to the use of laborers whose feet are not provided with shoes. Hoes intended for tilling the ground, instead of the plow and spade, are much larger and heavier than those used in gardening, and are raised much higher, and brought down to the ground with greater force, somewhat like the pickaxe. Hoes for stirring very stiff soil are sometimes made with prongs instead of a blade.

In the improved agriculture of the present day, implements called *Horse hoes* are extensively used. They are intended for purposes corresponding with those of the thrust-hoe, and may be generally described as consisting of thrust-hoe blades, variously modified, and attached to a frame in order to be drawn by a horse. Various contrivances are employed to accommodate the blades to inequalities of surface, etc. Horse-hoes can be only employed for crops sown in drills; and the drills must be perfectly parallel as when made by a machine, if more than one interval is to be cleaned and stirred at once. In turnip-husbandry, a horse-hoe with several blades is often used to clear away the weeds from one interval.

HOE, RICHARD MARCH: inventor: 1812, Sep. 12—1886, June 7; b. New York: son of Robert Hoe, manufacturer. He entered his father's printing-press manufactory 1827, became senior member of the firm on the death of his father 1833, also engaged in making steel saws, and obtained several patents for their improvement, invented the rotary or 'lightning' press and the web press, and established a free apprentice's school in connection with his foundry. See PRINTING.—His brother ROBERT HOE, (1815, July 19—1884, Sep. 13; b. New York), was associated with his father, and RICHARD M. HOE, became a member of the firm 1841, and was a founder of the National Acad. of Design.

HOECAKE, n. *hō'kāk:* name given to a cake of Indian meal, because sometimes baked on a hoe.

HOEK, n. *hō'ĕk* [Dut. *hoek*, an angle or corner]: in *S. Africa*, a valley like an embrasure in a mountain-chain; a tortuous or twisting mountain glen.

HOE'S MACHINE. See PRINTING.

HOEVEN, *hō'vĕn*, JAN VAN DER: distinguished Dutch naturalist: 1801–68; b. Rotterdam. After studying medicine at Leyden, he established himself as a physician in his native town, where he remained till 1835, when he was elected prof. of zoology in the Univ. of Leyden, an office which he held till his death. His most important work is *Handboek der Dierkunde* (Leyden, 1827–33), of which a second ed., entirely recast, appeared 1846, a German translation 1848; and an English translation, by Prof. Clark of Cambridge, under the title *Handbook of Zoology*, with important additions, by the author and the editor, 1856–58.

Jan must not be confounded with his brother, CORNELIUS PRUYS VAN DER HOEVEN, prof. of medicine in the Univ. of Leyden, and the author of several important works, among which is *De Historia Medicinæ* (Leyden 1842), and *D. Historia Morborum* (Leyden 1846).

HOF, *hōf:* manufacturing town of the kingdom of Bavaria, in Upper Franconia, in a fruitful district on the Saale, 23 m. n.e. of Beyreuth. Besides extensive manufactures of leather, and linen and woolen fabrics, an important transit trade, arising from its position on the frontiers of Bavaria, and on the railway connecting that country with Saxony, is here carried on. Iron and coal mines are worked in the vicinity. Pop. (1900) 32,781.

HOFER, *hō'fĕr*, ANDREAS: patriotic leader of the Tyrolese: 1767, Oct. 2—1810, Feb. 20; b. at St. Leonard, in the valley of Passeyr. In 1796, he led a body of Tryolese against the French on the lake of Garda; in 1808, secret deputies, among whom was Hofer, arrived at Vienna, to represent to the Archduke John the sufferings of the people, and their wish to be reunited to Austria. By the desire of the archduke, Baron von Hormay sketched for them a plan of an insurrection, which met with such success that, in three days, 1809, Apr. 11–13, nearly the whole country was liberated. Napoleon, however, was victorious in Austria, and at once marched three armies to the Tyrol, to subdue the rebellious peasantry, who had been abandoned by the Austrians, in accordance with the armistice of Znaim (1809, July 12). At first Hofer concealed himself in a cave in the valley of Passeyr; but when Spechbacher, Joachmi Haspinger, a Capuchin, and Peter Mayer, at the head of the armed population, renewed the defense of the Tyrol, and repeatedly defeated the enemy, Hofer issued from his retreat, and took the leadership of the Tyrolese. At a battle, Aug. 12, on the Iselberg, Lefèbvre was driven from the Tyrol. Hofer conducted the civil and military administration till the peace of Vienna (Oct. 14). The French and Bavarians poured, for the third or fourth time, into the country, and after a brief struggle Hofer was compelled to take refuge in concealment. After two months he

was betrayed into the hands of the French by a priest named Douay, conveyed to Mantua, tried, condemned, and shot. His family were indemnified for the loss of their property by the Emperor of Austria 1819, and his son ennobled. A statue of Hofer, executed by Schaller, was erected 1834 in the church of the Franciscans, at Innsbruck, near the tomb of Emperor Maximilian I.

HOFFMAN, *hŏf'man*, CHARLES FENNO: 1806–1884, June 7; b. New York: author. He received academical and collegiate education, was admitted to the bar 1827, practiced 3 years, and then adopted literature. He was an editor of the New York *American*, established the *Knickerbocker Magazine* 1833, bought the *American Monthly Magazine* of Henry William Herbert (q.v.) and edited it many years. and was afterward editor of the New York *Mirror* and *The Literary World*. The latter part of his life was clouded by a mental disorder. He published *A Winter in the West*; (1835); *Wild Scenes in Forest and Prairie* (1837); *Vanderlyn*, novel (1837); *Greyslaer*, novel (1840); *The Vigil of Faith, and Other Poems* (1842); *The Echo*, poems (1844); *Lays of the Hudson, and Other Poems* (1846), and *Loves' Calendar, and Other Poems* (1848).

HOFFMAN, EUGENE AUGUSTUS, American Episcopal clergyman: b. New York, 1829, March 21; d. near Plattsburg, N. Y., 1902, June 17. He was educated at Rutgers and Harvard Colleges and at the General Theological Seminary. He held successive rectorships at Elizabeth, N. J., Burlington, N. J., Brooklyn, N. Y., and Philadelphia, Pa., and in 1879 was appointed dean of the General Theological Seminary, New York, and with others of his family, heavily endowed that institution. Dean Hoffman built Christ Church and rectory at Elizabeth, N. J., and also churches at Woodbridge and Milburn, N. J. He was the author of *Free Churches* (1858); and *The Eucharistic Week* (1859 and 1893).

HOFFMAN, MURRAY, American jurist: b. New York, 1791, Sep. 29; d. Flushing. L. I., 1878, May 7. He graduated from Columbia College in 1809; was admitted to the bar, became assistant vice-chancellor of the superior court of New York in 1839, serving till 1843, and was elected judge in 1853, holding that position for eight years. He wrote: *Office and Duties of Masters in Chancery and Practice in the Master's Office* (1824); *A Treatise on the Practice in the Court of Chancery, in three volumes* (1834–40); *Reports of Cases, Court of Chancery* (1839–40); several treatises on Church Law and numerous other works.

HOFFMAN, RICHARD, American pianist and composer: b. Manchester, England, 1831, May 24. He came to New York in his 16th year. He received early instruction from Rubinstein, Liszt, Thalberg, Döbler and Meyer. After his arrival in America he made a tour of the country as a soloist, and later accompanied Jenny Lind on her tours; he also played with Gottschalk and Von Bülow in New York in 1875 Later he became an important figure in

American musical life. He has composed music for the piano, songs, anthems, ballads, and church music.

HOFFMANIST, n. *hŏf'man-ĭst:* in *chh. hist.*, follower of Daniel Hoffman, prof. of theology at Helmstadt, who 1598, maintained that there was a twofold truth, if it could be so called, one philosophical, the other theological, and that philosophical truth was falsehood in theology, or that reason and religion are antagonistic.

HOFFMANN, *hof'mân,* August Heinrich (commonly called Hoffmann von Fallersleben): distinguished German poet and philologist: 1798, Apr. 2—1874, Jan. 20; b. at Fallersleben, in the district of Lüneberg. He went 1816 to the Univ. of Göttingen, which, in 1819 he left for Bonn. He soon gave up theology, for which his father had intended him, and occupied himself exclusively with philological and literary studies, which, from his first acquaintance with the Brothers Grimm (1818), he turned more and more to his native language and literature. After traveling through the Rhine countries and Holland in search of popular poetry, and living some time in Berlin, he was made keeper of the university library of Breslau 1823, extraordinary prof. of the university there 1830, and ordinary prof. of the German language and literature 1835. The publication of his *Unpolitische Lieder* (Unpolitical Lays) led to his being deprived of his office 1842, Dec. 20. For some years afterward, Hoffmann, thrown entirely on literary work for his support, led a wandering life through the whole of Germany, Switzerland, and Italy, the subject of laudation on the one hand, or of vituperation on the other, and at times under the surveillance of the police. In 1845, he was naturalized in Mecklenburg. Restored to his rights in Prussia 1848, he drew from that time his statutory salary as a pension. He married 1849, settling on the Rhine, and in 1854 he went to Weimar. In 1860, he became librarian to the Duke of Ratibor at the castle of Korvei, on the Weser, where he died. His principal philological and antiquarian works are: *Horæ Belgicæ* (1830—37); *Reineke Vos* (1834); *Geschichte des Deutschen Kirchenlieds* (1832); collections of ancient German Political (1843) and Social (1844) songs; *Spenden zur Deutschen Literaturgeschichte* (1845); and *Die Deutsche Philologie* (1836). Hoffmann's own poetry has a close alliance to popular song, and hits the tone of a genuine simplicity, tenderness, and pathos to a degree that scarcely any other poet of recent times has reached. He also produced many admirable tunes for his songs. The *Gedichte* appeared 1834 (8th ed. 1874), and he published numerous collections of songs, as *Allemannische Lieder, Soldatenlieder, Kinderlieder*, etc. He wrote an autobiography in 6 vols. (*Mein Leben*, 1862–70).—See Wagner's *Hoffmann von Fallersleben* (1869), and Gottschall, *Porträts* (1876).

HOFF'MANN, August Wilhelm, F.R.S.: chemist: b. Giessen, 1818, April 8; d. Berlin, 1892, May 5. After obtaining the degree of doctor of philosophy, he became assistant to Liebig in the Giessen Laboratory, and subsequently was appointed extraordinary prof. of chemistry

in the Univ. of Bonn. When the Royal College of Chemistry was established, London 1845, Hoffmann was recommended by Liebig as highly qualified for the post of superintendent. This college, which has since merged into the Laboratory of the Royal School of Mines, owes much of its high character to his teachings and his scientific reputation. Hoffmann succeeded Prof. Graham as chemist to the mint. In 1865, Hoffmann accepted an appointment to be prof. of chemistry in the Univ. of Berlin, with the commission to found a chemical institute. He was a juror at all the international exhibitions (London, 1851 and 62; Paris, 1865 and 67). In conjunction with Dr. Bence Jones, he dited the later editions of Fownes's *Manual of Chemistry*. His numerous contributions to the *Annalen der Chemie und Pharmacie*, to the *Transactions of the Chemical Society*, and to the *Philosophical Transactions of the Royal Society*, are for the most part on the very highest departments of organic chemistry; and 1854 a royal medal was awarded to him for his *Memoirs on the Molecular Constitution of the Organic Bases*. It was in the course of these researches that he discovered in coal-naphtha aniline, the basis of the new colors mauve and magenta, which had previously been obtained only from indigo. For his practical application of this discovery, one of the great prizes was awarded him at the Paris exhibition 1867. Hoffmann's *Introduction to Modern Chemistry* (1865); 5th ed. (1871) soon led to great reforms in the teaching of chemistry.

HOFF'MANN, Ernest Theodor Amadeus (originally Wilhelm): one of the most original German story tellers: 1776, Jan. 24—1822, July 24; b. Königsberg, Prussia. He studied law there, and then found employment in the govt. offices at Grossglogau and in Berlin. In 1800, he became assessor to the govt. in Posen; but in consequence of some keen caricatures from him, which Gen. Zastrow and others in high position applied to themselves, he was removed 1802, as councilor to Plock, and 1803, in the same capacity to Warsaw, where the entrance of the French ended his career. Without prospects or fortune, he made use of his knowledge of music as a means of livelihood, and, though sometimes reduced to great straits, managed to support himself by giving music-lessons, and by contributing to the *Musical Gazette*, of Leipzig. In 1813, he went to Dresden as music director to a company of players alternating between Dresden and Leipzig, and continued to conduct the orchestra of the company till 1815. In 1816, he was again appointed by Prussia to be councilor in the royal supreme court of judicature at Berlin, where, before long, he was seized with a painful disease, the consequence of his irregular life, and after much suffering, died. From his youth, he had given his leisure hours to the study of music. The *Phantasiestücke in Callot's Manier*, *Elixire des Teufels*, *Nachtstücke*, *Die Serapionsbrüder*, *Lebensansichten des Kater Murr*, *Der Doppelgänger*, and a few shorter stories, appeared 1814–24. Hoffmann was a man of thorough originality, yet an excellent man of business and a lawyer. He

had a keen understanding, but was full of fantastic ideas, and a believer in demons. His character was made up of incongruities; and between like contradictory extremes his novels range. His fame rests mainly on his novelettes, which are masterpieces in miniature, such as *Das Majorat, Fräulein Scudéry, Doge u. Dogaresse.* Hoffmann's talents were wonderfully various; versatility was both his excellence and his defect: he not only distinguished himself as jurist, but also as poet and composer, and as caricaturist. He handled language in a masterly way, though not free from mannerism. A collection of his choice works appeared 1828 (10 vols), and an ed. of his collected works 1857 (12 vols.). See Hitzig, *Aus Hoffmann's Leben und Nachlass* (1823). In foreign countries, particularly France, Hoffmann has been repeatedly translated and imitated.

HOFF'MANN, Friedrich: 1660, Feb. 19—1742, Nov. 12; b. Halle: one of the most celebrated physicians of the last century. At the age of 15 his parents died, and very shortly afterward he was deprived by a fire of the small patrimony that devolved to him. Undismayed by misfortunes, he went 1678 to Jena, to study medicine, and thence proceeded to Erfurt, to become a pupil of the distinguished chemist Gaspard Cramer. He commenced practice at Minden in Westphalia, where he had influential connections, and where in a very short time he acquired a high reputation. After a residence of little more than two years in Minden, during which time he visited Holland and England, he removed to Halberstadt. In 1693, Frederick, Elector of Brandenburg, afterward King of Prussia, appointed Hoffmann to the professorship of medicine in the newly constituted Univ. of Halle. It was on his recommendation that the celebrated Stahl (q.v.), who had been his fellow-student at Jena, and subsequently became his great rival, was appointed one of his colleagues At the urgent request of the king, Hoffmann removed to Berlin, where he remained three years; but finding that he could not pursue his studies in the atmosphere of the court, he returned to Halle; and though he subsequently attended the king at Berlin during a long illness, Halle was his residence during the remainder of his life. As a physician and a medical teacher, Hoffmann enjoyed a celebrity second only to Boerhaave, who contemporaneously occupied the chair of medicine at Leyden. Some of his special doctrines are now of little practical value; yet as a whole they turned the attention of physicians in new and important directions. Haller asserts that he amassed a large fortune by the sale of secret remedies, one of which is still designated Hoffmann's Anodyne Liquor (q.v.).

Of his numerous works, the greatest is his *Medicina Rationalis Systematica* (Halle, 1718–40, 9 vols. 4to), which occupied him more than 20 years, and was concluded in his 80th year. His complete works have gone through various editions. His *Opera Omnia Physico-medica, Denuo Revisa, Correcta et Aucta,* were printed, Geneva 1640, in six folio vols.; reprinted after his death with five supplementary

vols. of previously unpublished *Opuscula.* These were reprinted at Venice 1745, in 17 vols., 4to, and twice subsequently at Naples on a still larger scale.

HOFFMANN, Heinrich, German painter: b. Frankfort-on-the-Main, 1814, Oct. 18. Beginning life as a room decorator, in 1843, he adopted landscape painting as his profession and studied under Jacob Becker with that end. Long wanderings and careful studies of nature in the Taunus Mountains, in Obenwald, and the Black Forest, as well as in the valleys of the Rhine and Mosel, were followed by extensive travels in Switzerland and the Tyrol. The results of this preparatory training appeared in his first large canvas in which the old romantic spirit was bent with an independent and realistic presentation of nature which at once attracted public attention. He has produced numberless Alpine and forest landscapes, moonlight and street scenes, most of which are in private collections at Frankfort.

HOFMANN, Heinrich, German painter: b. Darmstadt, 1824, March 19. In his native town he began his studies as a copper-plate engraver, but subsequently under Schadow and Hildebrande turned his attention to painting, to which henceforth he devoted his life. After extensive travels in Europe, which included a residence of four years in Italy, he settled at Dresden as professor of painting in the Academy there. The most famous of his pictures are: *The Burial of Christ*; *King Enzio in Prison*; *The Betrayal of Christ*, in the Darmstadt Gallery; *The Finding of Christ in the Temple*, in the Dresden Gallery; *Christ Preaching on the Lake*, in the Berlin National Gallery; *Venus and Cupid*; *Romeo and Juliet*; *Othello and Desdemona;* and *Christ in Gethsemane.* All the creations of Hofmann testify to his sense of refined beauty and are rather remarkable for harmonious coloring and delicacy than for originality of design or composition, as he clings to the tradition of the classic period in the ideal character of his conceptions. His works are popular and have been engraved and photographed more extensively perhaps than those of any contemporary German painter of his order.

HOFMANN, Josef, Polish pianist: b. Cracow, 1877, Jan. 20. He studied with his father, a professor in the Warsaw Conservatory and director of the Warsaw opera, appeared as a pianist in public at the age of six, became known as one of the most notable of musical prodigies, visited the United States in 1887–88, and was there prevented from playing through the action of the Society for the Prevention of Cruelty to Children. After a period of study, two years of which were spent as a pupil of Rubinstein, he made his début as a virtuoso at Dresden in 1894. His recitals in New York in 1901 showed him to be one of the leading modern pianists. His compositions include some interesting works for the pianoforte.

HOG, n. *hŏg* [W. *hwch*, a swine: Bret. *hoc'h*, a swine—from *houc'ha*, to grunt]: a pig; a swine; a gelded boar; a

flat rough broom used by seamen for scrubbing: V. to scrape and scrub a ship's bottom under water; to become bent upward in the middle—applied to a ship strained out of shape; to cut short, as the mane of a horse. HOG'GING, imp., HOGGING n. the distortion hogging of the furnace tubes of boilers caused by the expansion of the plates under the influence of heat. HOGGED, pp. *hŏgd*, applied to a ship which through some defect or strain, droops at each end. HOGGET, n. *hŏg'ĕt*, a boar of the second year. HOGGISH, a. *hŏg'ĭsh*, resembling a hog; filthy; greedy; selfish. HOG'GISHLY, ad. *-lĭ*. HOG'GISHNESS, n. HOG-STY, an inclosure or house for hogs. HOGGER-PUMP, the top pump in the sinking pit of a mine. HOG'GERS, n. plu. *-ĕrz*, stockings without feet worn by miners at their work. HOG'S BACK, in *geol.*, the ridgy structure of certain districts, consisting of alternate ridges and ravines. HOG-WASH, the liquid draff from the distillers given as a feeding stuff to swine. TO GO THE WHOLE HOG, in *Amer.*, to believe in and to follow out thoroughgoing principles; in *Eng.*, to spend the last *hog* or shilling; to carry a matter to the end, whatever may be the consequences. *Note.*—In old and prov. Eng. *hog* is a shilling; also said of a crown-piece.

HOG, or HOGG, n. *hŏg*, or HOG'GEREL, n. *-gĕr-ĕl* [Gael *og*, young—said of any animal: Norm. F. *hogetz*, a hog: Dut. *hokkeling*, a beast of one year old, from being fed in the *hok* or pen]: a young sheep of the second year; a young sheep that has not been shorn. HOG'GET, same as HOG. WEATHER-HOG, a young castrated male sheep. HOG COLT, a yearling colt. HOG'GING, n. a place where young sheep are pastured. *Note.*—HOG in Scot. is applied to the young of several animals, though HOG is a young swine primarily, it is also applied to a young sheep.

HOG, (*Sus*): genus of mammals of the family *Suidæ* (q.v.). The neck is large, straight and short, the skin thick and covered with stiff bristles mixed with fine, short hair. On top of the neck the bristles often assume the form of a mane. The nose is long, terminating in a cartilaginous disk which is strengthened by a small bone to fit it for loosening the soil. There are 22 teeth in each jaw. In the wild boar the canine teeth are largely developed. They are also curved, project from the jaw, and are formidable weapons of offense and defense. The tail is short and small. The feet are cloven. Besides the two main toes which are protected by hoofs there are two rudimentary toes on each foot. They seldom touch the ground but, like the principal toes, they are covered with a horny substance. The period of growth of the hog is about five years, length of life about 30 years. In its natural state the hog is not very prolific and the pigs remain with the sow until they are two or three years old. The sows and pigs are gregarious, but the adult males usually live alone. The wild boar is still found in forests in n. Europe, is somewhat common in India, and in various other regions. He is hardy, vigorous, fleet of foot, and a desperate fighter, and is highly prized by hunters.

HOG.

The common hog (*S scrofa*) is found throughout the civilized world and is among the most valuable of domestic animals. The ancient Egyptians regarded the flesh as unfit for food, and it was prohibited to the Jews and Mohammedans. Hindus and many of the Buddhists also reject it. But among the most progressive nations the flesh is an esteemed article of diet. The skin is valuable for the manufacture of leather, the bristles are largely used for brushes, the fat supplies lard, lard oil, and is one of the ingredients of soap, while almost every other part of the body serves some useful purpose.

In the early history of this country several importations of swine were made from Europe. The animals increased rapidly in numbers, but receiving little care they soon degenerated. In the early part of the present century small importations were made from China, and about 1820 a few Berkshire swine were brought from England and sold for high prices. By crossing with the imported stock the native hog was considerably improved in the districts to which the new stock found its way. From 1850 to 60 there were a number of importations from England, but it was not till 1870 that there was anything like a general call for improved breeds. About that time importations increased and a few American breeds which had been formed were widely disseminated. No other domestic animal can be developed as quickly and to such an extent as the hog, and the change which has been effected within the last half century is almost incredible The annual sales of swine bring more money to farmers than any other class of live stock, and in some years receipts from swine exceed those from all other animals combined.

Among the principal English breeds popular in the United States are the Berkshire, Large Yorkshire, Essex, and Suffolk. The Berkshire is of good size, hardy, prolific, fattens easily, and yields an excellent quality of meat, The color is black, with white on face, feet, and tail. The Large Yorkshires attain great size, are white, hardy, and prolific, but mature slowly. The Essex is small, rather delicate, fattens easily, matures early, and makes excellent meat· color black. It is not prolific, and is better for crossing with a larger breed than for keeping pure. The Suffolk is small, white, with thin tail and a tender skin, is not prolific, matures early, and is easily fattened. It is said to be the oldest pure breed known in any part of the world. Among American breeds the highest rank is taken by the Chester White, Poland-China, and Duroc. The Chester White is large, white, hardy, and prolific. It matures slowly, but can be fattened readily before it is fully grown. It originated in Chester county, Penn. Many inferior swine have been sold under the name of this really valuable breed. The Poland-China is probably the most popular breed in this country It originated in Ohio about 40 years ago, is large, prolific, fattens easily at any time, and supplies an excellent quality of pork: color, black and white. The Duroc, often called Jersey Red, is large

hardy, prolific, and fattens easily: color, red. It has been bred in N. J. about 50 years. There are many other breeds, both English and American, of less value.

The hog is very easily raised and is one of the most profitable of domestic animals. It requires less care than most kinds of stock, but amply repays proper attention. For its food it utilizes skimmed milk, surplus vegetables from the kitchen and garden, and various other materials which would otherwise be wasted. When fed with grain it fattens very rapidly and gives quick and profitable returns. By its means vast quantities of corn grown at the West are transformed into a far less bulky and much more valuable shape.

The best stock available should be used for breeding and the boar at least should be a thoroughbred. The sow should not be bred until a year old. The period of gestation varies from 100 to 115 days, being shorter with young than with old animals. From 4 to 16 pigs are produced in a litter, and a vigorous sow may be bred twice a year. Breeding sows should be supplied with a liberal quantity and a considerable variety of food, but should not receive much meal. The pigs should remain with the sow five or six weeks. During this time they should have milk in a small trough which the sow cannot reach. After their separation from the sow, oats and corn, soaked in water, may be fed with milk. Through the whole period of growth liberal feeding will be most profitable. A comfortable pen, kept clean and dry, should be provided.

The diseases of the hog are almost invariably caused by injudicious feeding or improper management. The various anthrax disorders known as 'Hog Cholera,' which sometimes cause the loss of millions of dollars in a few weeks to the farmers of the West, are obscure in their origin. The best authorities believe them to be caused by improper feeding, especially the almost exclusive use of highly concentrated food, impure water, and unhealthful surroundings; and they are confident that proper attention to hygienic conditions would be an efficient preventive. By the same means the minor diseases might almost wholly be done away.

HOGARTH, *hō'garth*, WILLIAM: 1697, Nov. 10—1764, Oct. 26; b. London: celebrated painter and engraver. He served apprenticeship to a silversmith in Cranbourne street named Ellis Gamble, and next studied under Sir James Thornhill, historical painter, but not with marked success. About 1720, he set up for himself, and his first employment was to engrave coats of arms, crests, shop-bills, etc., after which he undertook to execute plates for booksellers, the chief of which are the prints illustrative of *Hudibras* (Lond. 1726). He then tried his hand at portrait-painting, and soon had ample employment, though he never cared anything for this branch of art. In 1729, he married (clandestinely) a daughter of Sir James Thornhill, and soon began to display his extraordinary talent for representing in pictures the follies and vices of his time. In

1733, appeared his *Harlot's Progress*, a series of six pictures, which, like his other works, were engraved by himself. It was these engravings, and not the original paintings, that made Hogarth rich, and enabled him at the age of 48 to keep his carriage. The *Harlot's Progress* was followed by other moral histories and satirical representations of vice and folly, such as *The Rake's Progress* (eight engravings), *Southwark Fair*, *A Modern Midnight Conversation*, *The Distressed Poet*, and *Strolling Actresses in a Barn*. The success of these was great, and inspired Hogarth with the belief that he could win reputation as a historical painter also. After several ineffectual attempts, he recovered from his delusion, and returned to the path which nature had appointed him. In 1741, he published *The Enraged Musician;* 1745, *Marriage à la Mode*, in a series of six engravings, the pictures for which were purchased for the National Gallery; and 1748, *The March to Finchley*. In 1753, he published his *Analysis of Beauty*, which excited much opposition and ridicule, and in which Hogarth is generally held erroneous. In 1755 appeared *Four Prints of an Election;* and 1762, *The Times*, a cutting satire upon Pitt. Hogarth was buried at Chiswick, where a handsome monument was erected to his memory, with an inscription by his friend Garrick. In the technical part of his art, Hogarth was long thought not to have excelled, but modern opinion is more favorable in this respect. There has never, however, been any question regarding the greatness of his thought and invention, and his deep insight into the characteristics of his time and country. The moral of his satire is always stern, true, and unmistakable. A handsome edition of his works from the original plates, retouched by Heath, was published by Nichols (3 vols. Lond. 1820–22). See Lives by G. A. Sala (1866) and Austin Dobson (1879); and Chatto's ed. of works (3 vols. 1874).

HOGG, *hŏg*, JAMES: a Scottish poet: 1770–1835, Nov. 21; b. in the district known as the Forest of Ettrick, Selkirkshire. He was at school for two or three winters before he reached the age of eight, and then entered on the occupation of shepherd. His first song appeared anonymously 1801, and having gone shortly afterward to sell his employer's sheep in Edinburgh, he threw off 1,000 copies of verses which he had written. In the same summer, Scott visited the Ettrick Forest in search of materials for his *Border Minstrelsy*, when Hogg made his acquaintance, and placed in his possession a number of ballads, taken down from the recitation of persons resident in the district, which appeared in the third vol. of the *Minstrelsy*, 1803. In the same year, he published *The Mountain Bard*, the proceeds of which, together with two prizes for essays he received from the Highland Soc., amounted to £300. With this sum he took a farm, which proved a disastrous speculation. In 1810, he began a course of regular authorship. In 1813, his poem *The Queen's Wake* appeared. In 1814, he married; and though he afterward went to live on a farm given to him by the Duke of Buccleuch, he busied himself more

with books and booksellers than with sheep and grazing. His pen was profitable, which was more than he could bring his farm to be. He died at Altrive. His works are numerous, comprising, beside the above, *Madoc of the Moor; The Pilgrims of the Sun; The Jacobite Relics of Scotland; Queen Hynde; The Border Garland;* and some songs of great beauty. He wrote extensively also in prose. His prose works are—*The Brownie of Bodsbeck*; *Winter Evening Tales; The Three Perils of Man; The Three Perils of Woman; The Altrive Tales*, a vol. of *Lay Sermons*, and *Life of Sir Walter Scott.*

After Burns, Hogg is unquestionably the greatest peasant-poet of Scotland. His finest work, in conception and finish, is *The Queen's Wake.* The general flow of the poem is lively and harmonious, while in one portion, that of *Kilmeny,* the reader seems to hear 'the horns of Elfland faintly blowing;' another, *The Witch of Fife*, is weird. His prose works, though unequal, occasionally show great humor and always abound in graphic description. See *Memorials of J. Hogg* by his daughter, Mrs. Garden (1885).

HOGGINS, n. plu. *hŏg'ĭns* [Icel. *hagga,* to move, to jog—from the jogging motion of the sieve]: in OE., sand sifted from the gravel before the stones are carted upon the roads.

HOG-GUM: name given in the W. Indies to a resinous substance, there extensively used as a substitute for pitch, to tar boats and ropes; also for strengthening-plasters, etc., and internally as a diuretic, laxative, and stimulant medicine. It is disputed what tree produces the true hog-gum; some ascribing it to *Moronobea coccinea*, of nat. ord. *Guttiferæ;* some to *Rhus metopium,* a species of sumach, ord. *Anacardiaceæ;* and some to *Helwigia balsamifera,* ord. *Amyridaceæ.* The probability is that all these—and perhaps other—trees yield resinous substances of similar quality, commonly designated by the same name.

HOGH, n. *hŏg* [Norm. F. *hogue*, a hill—from mid. L. *hōgă*, a hill, a mound]: in *OE.*, a hill; a rising ground; a cliff.

HOGMANAY, n. *hŏg'măn-ā'*, or HAGMENA [Norm. F. *au gui menez,* lead to the mistletoe]: in the n. of England, and lowlands of Scotland, an old name of the last day of the year, and of New Year's Eve (see NEW YEAR); a noted festival day; and one employed in merriment. There was a custom, now scarcely known, for persons to go from house to house on 'Hogmanay-night,' asking in rude rhymes for cakes and cheese. *Note.*—In prov. Eng. *hogmena* [AS *halig monath*, holy month] is a name given to the month of December, and to the giving of gifts in that month, particularly on the last day. In Devonshire, *hogminnie* is a word of contempt for a young woman. Gael. *og,* young; *maighdean*, a maid or virgin; *mnai*, women. Any connection with women and gifts clearly points to an anc. festival—see Dr. C. Mackay. As a probable source, we are also referred to a prov. F. *haguine;* Sp. *aguinaldo*, a New Year's gift—but every suggested origin of this word is mere guesswork.

HOG PLUM—SPANISH PLUM—BRAZILIAN PLUM: names given in the W. Indies and other tropical countries to the fruit of certain species of *Spondias*. The genus *Spondias* belongs to the nat. ord. *Anacardiaceæ*, or, according to some botanists, to a small ord. *Spondiaceæ*, differing from *Anacardiaceæ* in the lack of a resinous juice, and in the drupe having a nut with 2–5 cells and seeds, instead of one cell and one seed. The species of *Spondias* are trees and shrubs with pinnate leaves, which have a terminal leaflet, and flowers in racemes or panicles. Some produce very pleasant fruits, among which are *S. purpurea* and *S. lutea;* the species generally called Hop Plum in the W. Indies, because they are a common food of hogs, which revel in their abundance. *S purpurea* has fruit about an inch in length, ovate or oblong, purple or variegated with yellow; the pulp yellow, with a peculiar but agreeable acid and aromatic taste. The fruit of *S. tuberosa*, called IMBUZEIRO in n. Brazil, is about twice the size of a large gooseberry, oblong, yellowish, with leathery skin and sweetish acid pulp. A much esteemed Brazilian dish is prepared of milk, curds, sugar, and the pulp of this fruit, from which also a refreshing beverage is made for use in fevers. The tree is remarkable for the numerous round black tubers —about eight inches in diameter—which it produces on its widely spreading roots, and which are very cellular, and full of water. They are evidently intended for the wants of the tree in the dry season, and are often dug out by travellers for the water, of which each tuber yields about a pint—Closely allied to *Spondias* is the genus *Poupattia*, to which belongs the VI or TAHITI APPLE, formerly *Spondias dulcis*, a very fine fruit of the South Sea Islands.

HOGSHEAD, n. *hŏgz'hĕd* [Dut. *ochshood;* Sw. *oxhufwud*, head of an ox, a hogshead: Ger: *oxhoft*, a hogshead]: old English measure of capacity. For wine, it was equivalent to 63 gallons; for ale and beer, 54 gallons. In the United States, it is still used as a measure for liquids, equivalent to 63 gallons; but when used for tobacco, it varies in different states from about 750 to 1,200 lbs.

HOGUE, CAPE LA. See CAPE LA HOGUE.

HOHENLINDEN, *hō-ĕn-lĭnd'ĕn:* village in Upper Saxony (pop. 250), famous for the victory by Moreau over Archduke John, 1800, Dec. 3. After the expiration of the armistice concluded at Paersdorf, Nov. 13, Moreau's army took position on the plateau between the Isar and the Inn and the Austrian army, under Archduke John, on the right bank of the Inn. The Austrian main body advanced amidst drifting snow, and attacked the divisions of Grénier and Grouchy with the utmost fury; but the French receiving considerable reinforcements under Ney, the assailants were driven back; and being attacked in the rear, were totally routed. The victory was decided likewise at other points in favor of the French, who were prevented from pursuit only by inclement weather, bad roads, and the

short winter day. The Austrians lost 8,000 men killed and wounded, 11,000 prisoners, including 180 officers, and 100 pieces of artillery. The French lost 5,000 men killed and wounded. Negotiations were resumed, soon resulting in the peace of Lunéville.

HOHENSTAUFEN, *hō'ĕn-stow-fĕn:* German princely house, which kept possession of the imperial throne 1138—1254. The founder of the family was FREDERICK VON BUREN, who lived about the middle of the 11th c., and assumed the name of Hohenstaufen from a castle of that name, the ruins of which are still seen on the summit of the Hohenstaufen Berg (2,240 ft.), a hill on the left bank of the Danube about 30 m. below Stuttgart. His son was the Chevalier Frederick von Staufen, Lord of Hohenstaufen, who steadfastly supported Emperor Henry IV., and in return received the duchy of Swabia. Duke Frederick, at his death 1105, left two sons—Frederick II., the One-eyed, and Konrad; the former was immediately confirmed in Swabia by Henry V.; and 1112 the latter received the duchy of Franconia. After the death of Henry V., his family estates fell to the House of Hohenstaufen; and Lothaire of Saxony was elected his successor in the empire.

On Lothaire's accession, he revoked the grants made by previous emperors to the house of Hohenstaufen, and thus gave rise to a furious war, in which Duke Frederick (his brother Konrad being absent in the Holy Land) had to encounter, single-handed, the whole power of the emperor, the House of Zähringen, and Henry the Proud, Duke of Bavaria and Saxony. After Konrad's return, fortune at first seemed to favor the brothers, but 1135 they were compelled to implore the emperor's forgiveness. They were then put in possession of all their estates. Konrad, 1138, was elected Emperor of Germany, as Konrad III. The succeeding emperors of this family were FREDERICK I. (q.v.) (1152–90), HENRY VI. (1190–97), PHILIP I. (1198–1208), FREDERICK II. (q.v.) (1212–51), and KONRAD IV. (1251–54).

HOHENZOLLERN, *hō-ĕn-tsŏl'lĕrn:* province in s. Germany, but belonging to Prussia, is a narrow strip of land entirely surrounded by Würtemberg and Baden: about 441 sq. m.; pop. (1900) 66,780. The territory, whose surface is generally mountainous, is divided into the districts of Sigmaringen and Hechingen, which rank as mediatized principalities. The seat of provincial government is at Sigmaringen. Hohenzollern is watered by the Neckar and some of its affluents, and by the Danube, which crosses it; it is also traversed by the eastern offshoots of the mountain-ranges of the Black Forest, the Rauhe Alb, and the Hart. The mountain valleys are productive, and yield abundance of fruit and corn, and flax in sufficient quantities for exportation; the forests abound in fine timber; there are iron mines in some mountain districts, which yield also gypsum, salt, and coal. The principal branches of industry are agriculture and the rearing of cattle, and the manufacture of toys and other articles of wood.

The population is almost exclusively Rom. Catholic and is under the jurisdiction of the Abp. of Freiburg. There is a Rom. Catholic college at Hechingen.

The HOHENZOLLERN FAMILY, from which the present dynasty of Prussia and of Germany is descended, traces its descent from Count Thassilo, a Swabian, who lived about the beginning of the 9th c., and founded a castle near Hechingen, on the Zollern heights, whence his descendants derived their patronymic. Some vague traditions connect the house of H. with the Colonna family of Rome, and with other Italian houses. About 1165 the first separation took place, Frederic IV. founding the elder or Swabian, and Konrad I. the younger or Franconian line. The elder line was subdivided, 1576, into the branches of H. Hechingen and H. Sigmaringen. Frederic VI., representative of the younger line, 1415 received from Emperor Sigismund the investiture of the electorate of Brandenburg, thus founding the present reigning dynasty of Prussia. The two branches of the elder line continued unbroken till 1849, when, in accordance with a family compact formed 1821, which declared the king of Prussia chief of the joint houses, the reigning princes of H. Hechingen and H. Sigmaringen ceded their respective rights and principalities to that monarch, who agreed to pay them annual pensions.

HOIDEN, or HOYDEN, n. *hoy'dn* [O. Dut. *heyden*, a rude, uncultivated man; *heyde*, a heath: W. *hoeden*, a flirt]: a rude or rustic girl: ADJ. rude; ill-taught; bold: V. to romp rudely. HOIDENING, or HOY'DENING, imp. *-dn-ĭng*. HOIDENED, or HOY'DENED, pp. *-dĕnd*. HOIDENISH, or HOY'DENISH, a. *-dĕn-ĭsh*, rude; bold.

HOIST, v. *hoyst* [F. *hisser;* Sw. *hissa;* Dan. *heise*, to hoist: F. *hausser*, to lift up]: to raise; to lift; to bear upward by means of tackle: N. a lift; an apparatus for raising or lifting bodies from the ground through the several floors of a building. HOIST'ING, imp. HOIST'ED, pp.

HOIST: a machine for raising heavy articles or substances, usually including means for swinging sideways so as to adjust to convenient position. The most common H. are known as cranes or derricks, but the terms are much mixed, so that it is not always possible to draw the line between these machines; in fact, some forms have been styled crane-derricks, and a very common form is often styled derrick-crane. In the primary use of the terms, a crane was a mechanism that swung to one side as well as raised, and a derrick one that hoisted but did not swing to one side, but as now manufactured most derricks have swinging mechanisms. Other forms are termed traveling cranes, gantries or gauntries, gantry-cranes, traveling gantries, etc. Many large cranes and gantries have been built to raise from 100 to 200 tons weight. Telpherage systems, coal- and ore-handling machinery and the like also include hoists. The winding-engine, ropes and buck-

ets of a main-shaft constitute a hoist, as well as the simple old-fashioned windlass of a well, and the modern elevator or lift.

Cranes.—The typical crane of large capacity is mounted on a rotating platform, which includes a steam plant for operating. From this a great arm or truss hangs to one side, there being chains or ropes for swinging and adjusting it, and tackle for hooking on loads, and raising or lowering them. A much lighter form of crane, often called a swing-crane, has a mast, fixed at top and bottom so as to turn, and a braced arm to which a pulley and tackle are adjusted; when this is arranged to turn in a full circle it is sometimes called a rotary crane. The traveling crane is very different, being a sort of overhead railway with depending hook and tackle; it is used in large factories for moving heavy machinery, castings, etc. An overhead track of two rails, set well apart, bears a truss moving on wheels, and on the truss is a rolling carriage with hoisting tackle. This can be moved to any position within the length and breadth of the two overhead rails, so that objects can be picked up in one part of a shop and readily transported to another. They are commonly operated by individual electric motors. The balance-crane is one having opposed arms, and a weight which can be run out on the arm opposite the weight lifted, so as to balance the structure. Magnetic cranes have come into considerable use, these being large electro-magnets that pick up iron and steel articles and hold them by magnetic attraction. They save the time required by other cranes in attaching and detaching the heavy articles that have to be hooked or tied to the lifting hook.

Derricks may have either one, two, three or four supporting legs or masts. The one-masted derrick with a swinging arm, commonly used by building contractors, and also called a derrick-crane and sometimes a crane, is made in a great variety of sizes and forms, but the typical machine has a stout mast of wood or steel, a swinging beam to which the hoisting tackle is adjusted, and a small steam-engine and windlass for operating. The most familiar form of two-legged derrick is the shears or shear-legs, consisting of a pair of beams joined at the top like the sides of a capital A. The tackle is attached at the top, and it lifts by being leaned over and pulled into erect position. This is probably the oldest form of H., and is believed to have been used in constructing the Pyramids. The gin type of derrick has either three or four legs or supports joined at the top, the hoisting tackle being attached at the junction. This form hoists but does not swing or adjust the weight to position. The most familiar type is the oil-derrick, now usually a steel framework about 90 feet high, with the four supports meeting at the top. From the top is suspended the mechanism for jumping or raising and dropping the free falling tools by which such wells are formed. See PETROLEUM.

The *gantry* or gauntry is essentially a great steel beam structure mounted on stout legs, which are supported on

wheels that may move on railway tracks. This structure is often big enough to straddle half a dozen railways tracks and permit trains to run underneath. On top of the structure is a traveling crane or a rotary platform crane running on wheels, arranged to hoist weights from any point within a given distance of the structure.

Mine-hoists consist commonly of a winding-engine, operating a large drum, around which winds a wire rope. This rope supports the mine-cage, in which workmen and tools are raised and lowered, or it raises the buckets of ore that are brought to the surface.

HOIT, v. *hoyt* [see under HOITY-TOITY]: in *OE.*, to leap; to caper. HOIT'ING, imp.: ADJ. over-lively. HOIT'ED, pp.

HOITY-TOITY, int. *hoy'tĭ-toy'tĭ* [Ger. *heyda heysa*, exclamations of high spirits and active enjoyment: Sw. *hojta*, to shout: OE. *hoit*, to indulge in noisy mirth: OF. *hait*, liveliness, gladness: Gael. *aite*, glad, joyous; *tait*, pleasure: imitative words]: an exclamation expressing a check to over-liveliness and exuberance of spirits; an old dance in time of Charles II.: ADJ. thoughtless; giddy; flighty.

HOKIANGA, *hō-kē-âng'gâ:* river of New Zealand, enters the Southern Ocean on the w. coast of the North Island, lat. 35° 30′ s., and long. 173° 26′ e.

HOLBACH, *hōl'bâch*, PAUL HEINRICH DIETRICH, Baron VON: French philosopher: 1723–1789, June 21; b. Heidelsheim, in the Palatinate; of wealthy parentage. At an early age, he went to Paris, where he resided during the remainder of his life. As H. was remarkable for his social qualities, and kept a good table, the most eminent thinkers and writers of the day, such as Condorcet, Diderot, Duclos, Helvetius, Raynal, Rousseau, Buffon, etc., were in the habit of assembling at his house. The witty Abbé Galiani called H. the *maître d'hôtel* of philosophy. Here speculation, it is said, was carried to such daring length, that Buffon, D'Alembert, and Rousseau felt obliged to withdraw from the circle. H. was the zealous champion of naturalism, and contended not only against Christianity but against every positive religion. His principal work is the *Système de la Nature* (1770). In this work, the author endeavors to expound the natural principles of morality, and to investigate the origin of the conflicting opinions on virtue and vice. He discusses the maxims of religious morality, and takes a rapid survey of social and savage life. He touches on the so-called 'social compact,' and in the course of his observations to prove, among other things, that self-interest is the ruling motive of man, and that God is only an ideal being, created by kings and priests. The materialism of the French *philosophes* of the 18th c. is nowhere more pernicious and paltry than in the writings of Holbach. It is but fair to state that his life was better than his books. He was a man of generous instincts in spite of his theory. When the Jesuits fell into disgrace during the reign of Louis XV., H., though he

hated their system, and had written against them in the days of their prosperity, made his house an asylum for his old foes when the clouds gathered around them.

HOLBEIN, *hōl'bīn*, HANS, The Elder: date of birth and death unknown; but supposed to have died abt. 1524; b. Augsburg: Bavaria: painter. He appeared first as partner to his brother Sigmund who survived him (died 1540) and who signed both his own and his brother's paintings. Holbein's work was mainly of a religious character, altar-pieces chosen from the Passion; and many of his drawings are preserved in the galleries of Basel, Berlin, and Copenhagen, displaying fine character portraiture. The closing years of his life were full of misfortune; he was accused as a defaulter at Augsburg; fled suddenly from Issenheim while executing a commission, and was sued by his brother and others for debt. Before 1512 many of his altar-pieces show artificial grouping and shallow stage-effect; after 1512 he seems to have regained some of his earlier N. Italian elements, modifying his old German art with a purer taste.

HOLBEIN, HANS, The Younger: one of the first masters of German art: abt. 1497–1543, Nov.; b. Augsburg; son of Hans Holbein, the Elder, from whom he learned the rudiments of art. When little more than 18 years of age, he adorned several houses and churches at Basel with portraits, frescoes, and altar-pieces. Tradition has preserved many of his droll sayings, and his life is as rich in anecdotes as those of the greatest Italian painters. Holbein grew tired of Basel, and Erasmus, who took great interest in him, and endeavored to induce him to abandon his irregular course of life, introduced him to Sir Thomas More, who kept him employed in England nearly three years, and then invited Henry VIII. to view his pictures. Henry surprised and delighted, exclaimed: 'Is the artist still alive, and is he to be had for money ?' More presented Holbein to the king, who took him into his service, and rewarded him liberally. Holbein continued in England, highly esteemed and fully employed till, 1543, he died of the plague. Though chiefly, and at many periods of his life almost exclusively, a portrait-painter, in this style he stands on a level with the great Italian masters, and takes precedence of all his German contemporaries. His portraits are not ideals, but nature apprehended in its most intellectual features; the execution is rich and perfect. To the earlier part of his career belong his most celebrated paintings, including *The Last Supper*, *The Dance of Death*, several pictures in the Dresden Gallery, two famous portraits of courtesans, etc. At a later period, his execution is slighter, and his style of coloring not entirely free from the mannerism of those Flemish painters who had studied in Italy. Some splendid and able portraits by Holbein, belonging to this period, are in the Louvre at Paris, in the Berlin Museum, at Longford and Windsor Castles. 87 sketches of persons belonging to the court of Henry VIII. by Holbein are still extant. His *Dance of Death*, the illustrations of the Old Testament, and three sets of alphabet

initials, would certainly entitle him to rank as one of the first wood-engravers, supposing them to have been not merely designed, but likewise engraved by him. This opinion has, however, been disputed, and the question remains undecided. A selection from Holbein's pictures in the Basel library appeared in lithographs (Basel 1829). See Lives by Wornum (Lond. 1867); Woltmann (2d. ed. Leip. 1873–76; Eng. trans. 1872); Cundall (Lond. 1879).

HOLBERG, *hōl-bĕrĊh*, LUDVIG: creator of modern Danish literature, and the earliest, wittiest and best writer of light comedy in Denmark: 1684, Dec. 3—1754, Jan. 28; b. Bergen, Norway, at the period when Norway formed part of the Danish dominions. The ten years which succeeded his appointment, 1718, as prof. of metaphysics in the Univ. of Copenhagen, where he had studied with the original intention of entering the ministry, embrace the most active literary period of his life; for during that time he composed his various satirico-heroic poems and romances, and the greater number of his numerous comedies, still regarded by his countrymen as the best productions of their kind in the Danish language. The creation of a national theatre 1722 by King Frederick IV., who sent for French actors to teach Danish players the art of declamation, had led Holberg to try his talents in dramatic writing, and with great success. Wealth and honors poured in on him as he advanced in years and he received a patent of nobility 1746. Holberg was not merely the greatest Danish writer, but one of the foremost European authors in his time. He first made Danish a literary language, and wrote a library of books. There have been innumerable editions of his works. His serio-comic poem, *Peder Paars*, passed through more than 20 editions; *Nicolai Klimii Iter Subterraneum* was translated thrice into Danish, ten times into German, and repeatedly into most European tongues. Many of his comedies remain masterpieces. See Georg Brandes's *Ludvig Holberg und seine Zeitgenossen* (Berl. 1885).

HOL'BROOK, JOHN EDWARDS, American naturalist: b. Beaufort, S. C., 1794, Dec. 30; d. Norfolk, Mass., 1871, Sep. 8. He was graduated from Brown in 1815, from the medical school of the University of Pennsylvania in 1818, began practice at Charleston, S. C., in 1822, and in 1824 was appointed to the chair of anatomy in the Medical College of South Carolina, a post he held for over 30 years. In the civil war he was head of the South Carolina examining board of surgeons. His *American Herpetology, or a Description of Reptiles Inhabiting the United States* (1842), won for him recognition among European scientists. He published but 10 numbers of his *Ichthyology of South Carolina* (1854 *et seq.*), when the civil war compelled its discontinuance.

HOL'COMB, SILAS ALEXANDER, American jurist: b. in Gibson county, Indiana, 1858, Aug. 25. He received a common school training, studied law in Nebraska, and in 1891 was made judge of the 12th judicial district. He was governor of Nebraska from 1894 to 1898, having been

elected by fusion of the Populist and Democratic voters. He has been justice of the supreme court of Nebraska from 1900.

HOL'COMBE, CHESTER, American diplomatist and author: b. Winfield, N. Y., 1844, Oct. 16. He was graduated at Union College in 1861; and served as interpreter and secretary to the United States Legation in China, 1871–85. Becoming an authority on the Chinese and Chinese affairs, in 1896 he acted for the Chinese government in its financial embarrassments. He has published: *Travels in Western China* (1875); *The Practical Effect of Confucianism upon the Chinese Nation* (1882); *The Real Chinaman* (1895); *The Real Chinese Question* (1899); etc.

HOLCONOTI, n. *hŏl'ko-nō-tī* [Gr. *holkos*, drawing to one's self, trailing; *nōtos*, the back]: fishes having marsupial pouches.

HOLCUS See SOFT GRASS.

HOLD, v. *hōld* [AS. *healdan*, to keep, to observe: Ger. *halten;* Dut. *houden;* Goth. *haldan*, to hold, to preserve: Icel *halla*, guard]: to stop; to detain; to have or grasp in the hand; to keep; to keep steady or fast; to contain; to possess; to be true; not to fail; to stick; to adhere; to maintain, as an opinion: N. a grasp, as with the hands; an embrace; power of keeping or seizing; influence: a fortified place; a prison: INT. or IMPERA. be still! forbear! stop! HOLD'ING, imp.: N. a tenure; a farm held of a superior; land or house rented; in *Scotch law*, tenure of heritable estate, according to the theory that all the land in Scotland is presumed to be holden of the crown as the superior, and all persons who hold the lands are called vassals. The great proprietors are called crown-vassals, and the little proprietors, who generally hold under the crown-vassals, are called vassals. The chief holding is called feu-holding (q.v.): see also TENURE: MORTIFICATION: BURGHS. HELD, pt. and pp. *hĕld*, did hold. HOLDER, n. *-ėr*, one who possesses anything; a tenant. HOLD'FAST, n. *-făst*, a long nail with a catch or hook. TO HOLD BACK, to restrain; to refrain from doing business. TO HOLD FORTH, to offer; to put forward; to harangue. TO HOLD IN, to restrain; to restrain one's self. TO HOLD OFF, to keep at a distance. TO HOLD ON, to continue; to proceed. TO HOLD OUT, to propose or offer; to yield not; to last or endure. TO HOLD TRUE or GOOD, to be a fact. TO HOLD TOGETHER, to remain in union. TO HOLD UP, to raise; to sustain or support; to continue fair, as the weather. TO HOLD ONE'S OWN, to keep one's ground. TO HOLD WITH, to cooperate with; to agree with; to adhere to. SYN. of 'hold, v.': to grasp; gripe; clutch; retain; consider; regard; think of; receive; defend; have; suspend; fix; save; confine; continue; solemnize; celebrate; conserve; manage; maintain; prosecute; stand; last; endure; refrain; —of 'hold, n.': gripe; seizure; support; catch; custody; power; fortress.

HOLD, *hōld* [Dut. *holte*, a cavity—from *hol*, hollow, a hole: Scot. *how*, hollow]: the interior cavity of a ship not

inhabited or set aside for passengers; the space where the cargo is stored: that interior compartment of a vessel throughout her length which is nearest to the keel. From the lowermost deck it extends to the very bottom of the ship; it is always below the water-line, and dependent on the hatchways for ventilation and what little natural light it obtains. In merchant vessels, the greatest portion of the cargo is stored in the hold; in men-of-war, it contains the bread-room, filled with provisions, the water-tanks for the supply of the ship's company, and almost all miscellaneous stores, such as spare masts, sails and blocks For this latter purpose, the hold is subdivided into sections by bulkheads. The *after-hold* lies abaft the mainmast, the *main-hold* just before the same mast, and the *fore-hold* is from the bow nearly to the main hatchway.

HOLDEN, *hōl'dĕn*, Albert J., American musician: b. Boston 1841. He studied music in New York, and since 1855 has been organist at the Church of the Divine Paternity and at the Church of the Puritans. He has composed more than 300 anthems, hymns and other church music, but his compositions are not confined to sacred music; they include songs, ballads, and choruses; he has also edited and compiled numerous collections.

HOLDEN, Albert W., English painter: b. London 1848, July 6. He studied drawing and antiquities at the British Museum, and gained a studentship at the Royal Academy of Arts, where he afterward exhibited. He has painted historical and humorous genre pictures, and has a high reputation as a portrait painter. Since 1887 he has been professor of fine arts, King's College, London. Among the well known works he has exhibited are: *A Bank Holiday* (1883); *Naughty Polly* (1898); *The Annunciation* (1896), etc.

HOLDEN, Edward Singleton, ll.d: astronomer: b. St. Louis, 1846, Nov. 5. He graduated in science at Washington Univ. 1866, and the U. S. Milit. Acad. 1870; became asst. prof. of philosophy at West Point 1871, and instructor in engineering 1872; resigned from the army and was appointed prof. of mathematics in the navy 1873; asst. to Prof. Simon Newcomb; planned the telegraph time-ball in New York; appointed prof. of astronomy in the Wis. Univ. and director of the Washington Observatory 1881; resigned from the navy 1882; was pres. of the Cal. Univ. 1883–8; director of the Lick Observatory 1888–98; then appointed astronomer of the Smithsonian Institution. He has published a large number of scientific and astronomical works including *Index Catalogue of Nebulæ* (1877); *Life of Sir William Herschel* (1881); *Astronomy* (with S. Newcomb, 1892); *Mountain Observatories* (1896); *Essays in Astronomy* (1900); etc.

HOLDEN, Sir Isaac, English inventor: b. Hurlet, near Paisley, 1807, May 7; d. Reighley, Yorkshire, 1897, Aug. 13. While a worker in a cotton mill in Paisley he fitted himself for the post of teacher. While conducting an experiment he discovered the lucifer match, but he secured no patent

on the invention, the financial benefit of which fell to others. Subsequently he was manager, then owner of a wool-combing establishment, and by his mechanical improvements made significant changes in that industry. His shops at Bradford, with branches at Croix and Rheims, eventually became the largest of the kind in the world. He was several times elected to Parliament in the Liberal interests.

HOLDER, *hōl'dĕr*, CHARLES FREDERICK, American naturalist: b. Lynn, Mass., 1851, Aug. 5. He studied at the United States Naval Academy, but resigned in 1871; in 1871–5 was assistant curator of the American Museum of Natural History, from that time turned his attention to lecturing and literary work, and became known as a leading writer on popular science. At Pasadena, Cal., whither he removed in 1885, he became president of the board of education, professor of zoology in Throop University, and honorary curator of the university museum. Among his publications are: *Elements of Zoology* (1885); *Living Lights* (1887); *Louis Agassiz, his Life* (1892); *Along the Florida Reef* (1892); *Stories of Animal Life* (1900); *Half-hours with Nature* (1901); etc.

HOLDING, a. *hōld'ĭng* [see HOLD 1]: in Œ., tenacious; sticky: N. burden or chorus of song.

HOLD'ING O'VER: in English law, and similarly in the laws of most of the states of the Union, the refusal to quit by a tenant, after a regular notice to quit, or at the end of his term. In such a case, the tenancy is held to be renewed on the same terms from year to year, if the landlord chooses not to enforce the quitting; but if the tenant himself gave the notice to quit, or the landlord demands possession at the expiration of his notice, and then the tenant refuses to quit, he is thereafter liable to double rent, or double value according as the notice to quit came from the tenant or the landlord.

HOLE, n. *hōl* [AS., Dut., and Icel. *hol;* Ger. *hohl*, hollow: Ger. *höhle*, a cave]: an opening in or through a solid body; an excavation in the ground; a perforation; a cavity; a mean place or habitation; a means of escape: V. to dig or make a hole in; to drive into a hole or bag, as in billiards. HOL'ING, imp.: N. in *coal-mining*, cutting under a seam of coal so as to deprive it of support and facilitate its falling down. HOLED, pp. *hōld*. HOLE AND CORNER, special and private to promote party ends or some disreputable object, as a *hole-and-corner meeting*. SYN. of 'hole, n.': excavation; concavity; hollow; aperture; interstice; pit; cave; den; cell; rent; fissure; crevice.

HOLED-STONES, n.: in *anthrop.*, name given to a peculiar kind of prehistoric stone monument, presumably sepulchral, occurring in Great Britain, France, Cyprus, and India. The size of the hole varies considerably, some being no larger than half a crown, others affording a passage for the human body. Their purpose is unknown. Fergusson speaks of the peculiarly binding nature of an oath sworn by

persons joining hands through a holed-stone at Stennis; in Scotland libations are poured through holed-stones in honor of Browny, the supposed guardian of bees; local superstition ascribes a curative property to the Men-an-tol, near Penzance, and people still creep through it in the hope of being cured of rheumatism. It has been suggested that this stone may have been connected with sun-worship.

HOLES: when the rivet holes in boiler plates are punched or drilled so inaccurately that they do not coincide within an amount equal to one half their diameters when the plates are brought together, they are called half-lap or half-blind holes. When the holes do not correspond within the extent of a whole diameter they are called blind-holes. In riveting, such holes are either pulled together with a drift, or they are reamed out and larger rivets inserted.

HOLI, or HOLEE, n. *hō'lē*, or HOOLI, *hô'lē* [Mahratta *Holi*, the festival so called]: the great Hindu spring festival, beginning at the full moon of the month Phalgun and lasting five days. It is meant to commemorate the gambols to which the god Krishna was addicted in his youth. It is the saturnalia of the Hindus.

HOLIDAY, n. *hŏl'ĭ-dā* [*holy* and *day*: comp. Dut. *heyligh-dagh*, a sacred day (see HOLY)]: day of freedom from labor; day of joy and gayety: ADJ. pertaining to a festival; gay. In *law*, holiday means a day appointed by the civil authority for general public observance. The appointment is through legislative act or executive recommendation.

In the United States there is no national holiday, not even July 4. The 53d Congress passed an act making Labor Day a public holiday in the District of Columbia, and various states have followed with a similar act. The proclamation of the President designating a day of Thanksgiving only makes it a legal holiday in the District of Columbia and in the territories. New Year's Day is a legal holiday in all the states except Massachusetts, Mississippi, and New Hampshire. Lincoln's Birthday (Feb. 12) is a legal holiday in Connecticut, Illinois, Minnesota, New Jersey, New York, North Dakota, Pennsylvania, Washington, and Wyoming. Washington's Birthday (Feb. 22) is a legal holiday in all the states except Mississippi. Decoration Day (May 30) in all the states except Alabama, Florida, Georgia, Idaho, Louisiana, Mississippi, North Carolina, South Carolina, and Texas. Independence Day (Juiy 4) in all the states and territories. Labor Day (in general, the first Monday in September) in all the states except Arizona, Mississippi, Nevada, and North Dakota. Election Day and Christmas Day are generally observed as legal holidays in all the states and territories. There are various state holidays, such as Patriot's Day (April 19) in Massachusetts, Pioneer's Day (Aug. 16) in Utah, All Saint's Day (Nov. 1) in Louisiana, Admission Day (Sept. 9) in California, and Confederate Memorial Day (May 10) in North and South Carolina. Every

Saturday after 12 o'clock noon is a legal holiday in New York, New Jersey, Pennsylvania, Maryland, Tennessee, Virginia, in the city of New Orleans and in Newcastle County, Delaware.

HOLILY, ad. *hō'lĭ-lĭ* [from HOLY, which see]: with sanctity; piously; in OE., inviolably.

HOLINESS, n. *hō'lĭ-nĕs* [from HOLY, which see]: freedom from sin; moral goodness; piety; purity; sacredness; a title of the pope.—SYN.: devotion; religiousness; godliness, sanctity, righteousness.

HOLING, n.. See under HOLE.

HOLINSHED, or HOLLINSHED, *hŏl'ĭnz-hĕd*, RAPHAEL: English chronicler: b. in the early part of the 16th c.; died between 1578–82; of a Cheshire family. The work by which he is remembered is entitled *The Chronicles of Englande, Scotlande, and Irelande* (2 vols. fol. Lond. 1577). This edition—the first—is known as the 'Shakespeare' edition, from the fact of its having supplied the great dramatist with materials for his historical plays. It contained some passages disagreeable to Queen Elizabeth, which were omitted in the second edition 1587. A modern edition, 6 vols., was published 1807–8, with the 'disagreeable passages' restored. Holinshed, though the principal, was not the only author of these *Chronicles*. He was assisted in his labors, among others, by William Harrison, who wrote the historical description of the island of Britain; and by Richard Stanihurst, who contributed an account of the condition of Ireland, to which John Hooker added the 'Conquest of Ireland' (a translation from the Latin of Giraldus Cambrensis). Holinshed has always been a favorite with black-letter scholars, and has been freely used by modern historians.

HOLKAR, *hol'kĕr:* title of the Maharajah of Indore (q.v.), long vested in a powerful Mahratta family. The founder of the family was Mulhar Rao Holkar (1693–1768, b. in Deccan). His last successor dying without heirs, the E. India Company assumed the right of nominating Mulkerji Rao Holkar, who was educated under the auspices of the British govt., and who has shown great ability since he assumed the reins of government 1852. On the breaking out of the mutiny 1857, he took the field in support of the British, but the refractory behavior of his troops prevented his rendering any effective assistance. See INDORE.

HOLLA, n. *hŏl'ă*. See HOLLO.

HOLLAND, n. *hŏl'lănd* [Dut. *hol*, hollow, and *land*—*lit.*, the low-lying land]: term which, while formerly applied only to linens imported from the Netherlands, is now used to designate the glazed and unglazed linen cloths that are made in many places. 'Brown Holland' is a cloth that maintains much of the original color of the retted flax-fibre, it having been subjected to but little bleaching or boiling. HOL'LANDS, n. plu. *-lăndz*, Dutch

or a superior kind of gin (see GIN). HOL'LANDER, n. a Dutchman.

HOLLAND, *hŏl'land:* a name frequently applied to the kingdom of the Netherlands (q.v.), though in the strictest sense it is applicable only to the provinces of North and South Holland (q.v.).

HOL'LAND, Sir HENRY, Bart., M.D., F.R.S., D.C.L., LL.D., etc.: 1788, Oct. 27—1873, Oct. 27: b. Knutsford, Cheshire: eminent physician. He received his professional education in London, and subsequently at the Unv. of Edinburgh, where he graduated M.D. 1811. He spent two or three years in e. Europe; and 1815, after his return to England, published *Travels in Albania, Thessaly, etc.*, in a 4to vol. He settled in London, and soon rose to eminence in his profession. In 1828, he was elected a fellow of the Royal College of Physicians, a distinction at that time very rarely conferred on a Scottish M.D. In 1840, he was appointed physician-in-ordinary to the prince consort, and 1852, physician-in-ordinary to the queen. In the following year he was made a baronet. In 1856, the Univ. of Oxford conferred on him the honorary degree D.C.L., and he likewise received the degree LL.D. from Harvard Univ. In 1840, he published a vol., *Medical Notes and Reflections*, consisting of 34 essays, which has passed through several editions. In 1852, his *Chapters on Mental Physiology* appeared, expansions of those essays in his former work which treated of that 'particular part of human physiology which comprises the reciprocal actions and relations of mental and bodily phenomena.' His *Essays on Scientific Subjects* (1862), relating to many of the most profound subjects in physics, show that if his special studies had taken a different direction, he would have attained fame as a natural philosopher. The *Recollections of Past Life* he published 1871.

HOL'LAND, Lord, HENRY RICHARD FOX, VASSALL-HOLLAND, third baron, F.R.S. English statesman: 1773, Nov. 21—1840, Oct 22; b. Winterslow House, Wilts; nephew of Charles James Fox; descended from Henry Fox, first baron, sec. of state to George II. Holland succeeded to the title on the death of his father, the second baron, 1774. He went to Eton, thence to Christ Church. He was trained for public life by his celebrated uncle, Charles James Fox, and made his first speech in the house of lords 1798, Jan. After the death of Mr. Fox, Holland held the post of lord privy seal in the Grenville ministry for a few months. He then shared the long banishment of the whigs from the councils of their sovereigh. During this long and dreary interval, Holland, to use the language of Macaulay (who has paid an eloquent tribute to his memory), was the 'constant protector of all oppressed races and persecuted sects.' He held unpopular opinions in regard to the war with France, and signed a protest against the detention of Napoleon at St. Helena. On the other hand, he labored to ameliorate the severity of the criminal code; made manful war, though a W. India planter, on the slave trade; threw

his whole heart, though a landowner, into the struggle against the corn laws; and though by rank and breeding an aristocrat, labored incessantly to extend and confirm the rights and liberties of the subject. In 1830, he became chancellor of the duchy of Lancaster, and a member of the reform cabinet of Earl Grey, and these posts he held also in the Melbourne ministry. He died at Holland House, Kensington. In his ample person and expressive features, he resembled his celebrated uncle.

HOLLAND, John P., American inventor: b. 1841. As one of the most successful designers in the interesting field of submarine navigation, Holland is well known. His first boat was built in 1875; a second was launched in 1877, and a third in 1881. After a series of severe tests, the Holland boat was ordered by the United States government for the navy in 1900. In 1903 eight of the submarines were put in commission. These have a speed varying from 8.87 to 8 knots, a horse-power of 160 (with one exception), and a displacement in general of 122.55 tons. For some time the inventor was interested in the Holland Submarine Boat Company, but from this he has now retired to devote his time independently to submarines and flying devices. His more recent designs callfor smaller and more compact vessels, with much less complicated mechanism, power of remaining longer submerged, and increased safety in operation. See Submarine Navigation.

HOLLAND, Josiah Gilbert, m.d.: 1819, July 24—1881, Oct. 12; b. Belchertown, Mass.: author and poet. He graduated at the Berkshire Medical College, Pittsfield, Mass., 1844, practiced a short time in Springfield, Mass., taught school in Richmond, Va., was supt. of public schools in Vicksburg, Miss., and became editorially connected with the Springfield *Republican*, Mass. 1849. He followed daily journalism till 1866, and as editor and part owner started *Scribner's Monthly* 1870, which became *The Century* 1881. Having removed to New York, he was elected a member of the board of education of that city 1872, and during part of his service was its pres.; and he was also chairman of the board of trustees of the College of the City of New York several years. Holland began his literary career soon after graduation by contributing several articles to the *Knickerbocker Magazine*, and for six month conducted a literary paper of his own. While on the Springfield *Republican* he wrote a series of popular social and domestic essays, and published his first book *History of Western Massachusetts*, 2 vols. (1885). This was followed by his first story *The Bay Path: a Colonial Tale* (1857). About this time he began another series of essays, *Timothy Titcomb's Letters to Young People, Married and Single*, which was very popular and composed his third book (1858). The same year he published *Bitter Sweet: a Poem in Dramatic Form*. In 1865 he brought out a popular *Life of Abraham Lincoln*, 1867 *Kathrina: Her Life and Mine in a Poem;* and 1868 made a tour of Europe. Beside the

above he published *Gold Foil* (1859); *Miss Gilbert's Career* (1860); *Lessons in Life* (1861); *Letters to the Joneses* (1863); *Plain Talks on Familiar Subjects* (1865); *The Marble Prophecy, and Other Poems* (1872); *Arthur Bonnicastle*, and *Garnered Sheaves* (1873); *The Mistress of the Manse* (1874); *The Story of Seven-oaks* (1875); and *Nicholas Minturn* (1876). All his works were of the highest moral tone, and many of them obtained very great popularity.

HOLLAND, Thomas Erskine, English jurist: b. Brighton, 1835, July 17. He studied at Oxford, was called to the bar in 1863, in 1874 became a reader in English law at Oxford, and shortly afterward professor of international law. The University of Perugia appointed him to an honorary professorship in recognition of his attainments. His best known work is his *Elements of Jurisprudence* (1880; 9th ed. 1900), to which was awarded the Swinney prize (1894), decennially bestowed for the best book published on jurisprudence, and which is now a standard text-book in England and the United States. He wrote further: *An Essay on Composition Deeds* (1864); *Essays on the Form of the Law* (1870); *The European Concert in the Eastern Question* (1885); *Studies in International Law* (1898), and other works.

HOLLAND, William J., American Presbyterian clergyman and educator: b. Jamaica, W. I., 1848, Aug. 16. He was graduated from Amherst College in 1869, from the Princeton Theological Seminary in 1874, entered the ministry of the Presbyterian Church, and was a pastor at Pittsburg, Pa., in 1874–91. In 1891–1901 he was chancellor of the Western University of Pennsylvania (Allegheny), and in 1897 was appointed director of the Carnegie Museum at Pittsburg. In 1887 and 1889 he was naturalist of the United States eclipse expeditions to Japan and West Africa respectively. A recognized authority on museum administration and zoology, he wrote numerous scientific papers in learned publications, and *The Butterfly Book* (1898).

HOL'LAND, New: former name of the island or continent of Australia (q v.).

HOL'LAND, North: province of the kingdom of the Netherlands, bet. 52° 10′ and 53° 18′ n. lat., 4° 30′ and 5° 20′ e. long.; 1,050 sq. m. Pop. (1901) 1,001,799. North Holland consists of a peninsula joined to the mainland at its s. extremity, and of the islands of Wieringen, Texel, and Vlieland, at its n. extremity. It is bounded w. by the German Ocean, and e. by the Zuider Zee. The surface is marshy and in many places below the level of the sea, from whose encroachments it is protected by dunes and dikes, while canals intersect and drain it in every direction. The principal river is the Amstel. The canal from Amsterdam to Nieuwediep is an important water-way, though now superseded (for large ships) by one through the peninsula, opened 1876, Nov. 1. The Haarlem Lake (q.v.) has been drained and converted into productive land, with pop.

estimated about 15,000; but there remain various small lakes or ponds in the marshy districts. The chief towns of the province are Amsterdam, Haarlem, Alkmaar, Zaandam or Saardam (q.v.).

HOL'LAND, Parts of. See Lincolnshire.

HOL'LAND, South: province of the kingdom of the Netherlands, between 51° 45′ and 52° 20′ n. lat., and 3° 50′ and 5° 10′ e. long.; 1,162 sq. m., Pop. (1901) 1,194,463. Bounded n. by N. Holland, e. by Utrecht and Gelderland, s. by the Maas, which separates it from Zeeland and N. Brabant, w. by the German Ocean. S. Holland comprises the land around the embouchures of the Rhine and Maas, which in its southern portion is divided into several islands—viz., Voorne, Overflackkee, and Goeree, Putten, Ysselmonde, Beijerland, etc. The country is flat and low, and is broken by no elevation beyond the downs, which protect it from the sea. Streams and canals intersect it in all directions, and it abounds with lakes and with *polders*, or lands that have been recovered from the sea or lakes by draining. One of the most noted of these is the Biesbosch, land recovered from a marshy lake which was formed by the terrible inundation of 1421. The chief rivers are the Old Rhine, the Yssel, Lek, Maas, and Merwede. The principal towns of S. Holland are the Hague, Leyden, Rotterdam, Dordrecht, Gorinchem, Brielle, Gouda, Delft, and Schiedam (q.v.). The two provinces of Holland rank among the most populous districts of Europe, and their inhabitants are distinguished for industry and habits of cleanliness. The rearing of cattle, of which there are more than a million in N. and S. Holland, and the preparation of butter and cheese, are principal industries in the rural districts. Alkmaar in N. Holland, and Gouda in S. Holland, are the great centres of the cheese-trade, at Alkmaar averaging annually about 8,705 cwts. The provinces of Holland have the largest share of the national commerce and wealth.

HOLLAND, Mich., city, in Ottawa County, at the head of Black Lake, which is really an arm of Lake Michigan, and on the Père Marquette railroad; about 80 miles west of Lansing and 25 miles southwest of Grand Rapids. It has direct communication by steamers with Chicago, Milwaukee, and other lake ports. Holland was settled in 1847 by a Dutch colony, and many of its inhabitants are of Dutch descent. In 1867 it was chartered as a city. It is located in an agricultural region, once a lumber section. The manufactures are largely articles made of wood, but the beet-sugar industry is growing in importance. The chief manufacturing establishments are planing-mills, furniture, tub, and basket factories, flour-mills, tanneries, wood-working machinery shops, pickling-plants, beet-sugar factory, grain elevators, and creameries. The manufacture of launches is also an important industry of Holland. The trade is chiefly in the manufactures, and in grain and vegetables. The city owns and operates the

electric-light plant and the waterworks. Holland is the seat of the Western Theological Seminary and of Hope College, both under the auspices of the Reformed Church in America. It has a number of fine public buildings, and a free public library. The summer resorts on Black Lake add to the industrial wealth of the city. Pop. 10,490.

HOLLEY, *hŏl'lĭ*, ALEXANDER LYMAN, LL.D.: 1832, July 20—1882, Jan. 29; b. Lakeville Conn.: metallurgist and civil engineer. He graduated in science at Brown Univ. 1853, spent four years as draughtsman and machinist in locomotive-works and machine-shops, contributed more than 200 articles to the New York *Times* and the *American Railway Review* on engineering and mechanical topics 1858–63, went to England to study the Bessemer process of manufacturing steel 1863, established the first American Bessemer plant at Troy, N. Y., 1865; and subsequently planned and built the works at Harrisburg, Pittsburg, Joliet, N. Chicago, and St. Louis, and aided in planning those at Cambria, Bethlehem, and Scranton, in Penn. He was president of the American Institute of Mining Engineers 1875, vice-president of the American Soc of Mechanical Engineers and of the American Soc. of Civil Engineers, member of the U. S. board for testing metals, and lecturer on iron and steel manufacture in Columbia College School of Mines. He published a large number of important technical works, and received the degree LL.D. from Brown Univ. 1878.

HOLLEY, *hŏl'lĭ*, MARIETTA (pen-name, *Josiah Allen's Wife*): born Ellisburg, Jefferson co., N. Y., 1844. In early life, she wrote poetry which attracted attention, and many of her verses were widely copied in this country, and some reprinted in England. Afterward, wishing to help her parents she commenced writing humorous prose, and quickly achieved a remarkable success. Most of her life has been passed in the town in which she was born. Besides numerous contributions to periodicals, she has written: *My Opinions and Betsy Bobbetts* (1873); *My Wayward Pardner* (1880); *The Mormon Wife* (poem) (1880); *Miss Richard's Boy* (1883); *Sweet Cicely* (1885); *Samantha at the Centennial* (1887); *Miss Jones' Quilting* (1887); *Poems* (1887); *Samantha at Saratoga* (1887); *Samantha Among the Brethren* (1890), considered one of her best works; *Samantha Among the Colored Folks* (1892); *Samantha at the World's Fair* (1894); *Samantha in Europe* (1896); *Around the World with Josiah Allen's Wife* (1900). Her writings have been translated into several foreign tongues.

HOLLIDAY, *hŏl'ĭ-dā*, BEN: 1819–1887, July 8; b. Bourbon co., Ky.: pioneer. He was an early settler in w. Mo. and Kan.; contractor for army supplies during the Mexican war; engaged in mercantile business in San Francisco and Salt Lake City 1849–52; established the first mail and overland express after the discovery of gold in Cal., covering a large territory with a fast pony service; and subsequently

became a Pacific steamship and Nev. mine owner. From the proceeds of his celebrated Ophir mine, he laid out a grand estate in Westchester co., N. Y., with a $1,000,000 stone residence, private chapel, and mortuary building. Legal complications reduced his great wealth to a bare competency, and he passed his last years in Portland, Ore. One of his daughters married the French Count de Pourtales and the other Baron de Bussière.

HOLLIDAYSBURG, *hŏl'ĭ-dāz-bèrg:* town, cap. of Blair co., Penn.; on a branch of the Pennsylvania railroad and of the Juniata river; 8 m. s. of Altoona. There are valuable coal and iron mines and limestone quarries in the neighborhood, and the town has foundries, blast furnaces, rolling-mills, machine-shops, and nail, mining, and farming implements factories. It is the seat of Hollidaysburg Female Seminary. Pop. 3,050.

HOLLIS, Thomas: 1659–1731, Feb.; b. England. He accumulated a fortune in mercantile business in London, and made donations to Harvard College. He founded the Hollis professorship of divinity there 1721; and a professorship of mathematics and philosophy 1727. Among his gifts to the college were fonts of Greek and Hebrew type, and many books.

HOLLO, or Holloa, int. *hŭl-lō'*, also spelled Hol'la, and Hol'lo [F. *holà,* ho there!]: an exclamation used in calling to some one at a distance to stop or wait; a word expressive of surprise: V. to call the attention of some one at a distance: N. a shout, a word of command to stop. Hollo'ing, imp.: Holloed, pp. *hŭl'-lōd'*. Holloa is a different word from Halloo, which see.

HOLLOW, a. *hŏl'lō* [from Hole, which see]: having an empty space within; not solid; deep; not sincere or faithful; not real; false: N. any depression of surface; a cavity; a pit; a groove: V. to dig or scoop out; to excavate: Ad, without difficulty, as he carries it *hollow;* without a chance of success, or beyond a doubt, as he was beaten *hollow*—see phrase below. Hol'lowing, imp. Hol'lowed, pp. *-lōd.* Hol'lowly, ad. *-lĭ,* in a hollow manner; dishonestly; insincerely. Hol'lowness, n. state of being hollow; insincerity; deceit. Hollow-hearted, insincere; treacherous. Hollow square, in a *body of foot,* soldiers drawn up in the form of a square with an unoccupied space in the middle. Hollow-stays, hollow stay-bolts inserted through the inside and outside sheets of the furnace near the crown-sheet, through which air is admitted to the furnace to increase the combustion. Hollow structures, the frames, standards, and parts of large machines and structures, made hollow from motives of economy, or to reduce their weight while retaining their strength. They are represented by the various forms of box girders, base plates, columns, etc. Hollow-eyed, having the eyes sunk in the head. I beat him hollow, a probable corruption of the phrase 'I beat him wholly,' that is 'completely.'—Syn. of 'hollow, n.': concavity; excavation; cavern; den;

hole; bore; opening; hollowness;—of 'hollow, a.': vacant; empty; concave; sunken; low; faithless; deceitful; insincere; dishonest; treacherous.

HOL'LOW-WARE: trade term, for such common iron utensils as are hollow, e.g., caldrons, saucepans, kettles, etc There are two classes of iron goods so-called—viz., cast iron hollow-ware and wrought-iron hollow-ware. Both include cooking and other vessels for domestic use, and comprise also some other articles, such as coffee-mills, which are molded and finished in a similar way. Wrought-iron hollow-ware is made largely by the process of stamping (q.v.), but a great deal is made by the older way of joining pieces together. Vessels of this kind not intended for cooking are generally coated with zinc, while those for cooking have usually a coating of tin. Both metals are put on the iron by immersion. There is also a process in use for coating the surface with silicious enamel, described below. Since the introduction of these methods of protecting and beautifying the surface of iron, domestic vessels of this metal have greatly taken the place of those of copper and brass.

Cast-iron hollow-ware is finished in three ways—some of it is enamelled, some tinned, and some of it is left *black*, or untinned; but there is comparatively little of the last now used. The process by which tinned hollow-ware is made was patented by Jonathan Taylor, a Birmingham workman, 1779. It is conducted as follows: A vessel, such as a saucepan or goblet, is cast in a mold prepared in the ordinary way from an iron or a brass pattern: see FOUNDING. The vessel is then annealed, to soften the cast-iron preparatory to turning, and such articles are then turned quite smooth on the inside, by means of a common lathe when they are circular and by an oval lathe when they are oval like fish-pans, a workman holding and directing the tool in both cases. Self acting lathes have been tried, but hitherto without saving in the cost. The operation of tinning follows, and is performed by the workman pouring small quantities of melted tin on the inside of the vessel, which he rubs on with a piece of cork, gradually going over the whole surface. A little salammoniac is thrown in during the process to make the tin adhere. Handles of malleable iron are then put upon such vessels as require them, and the finish is given by coating the outside with a black varnish dried in a stove. The covers of saucepans are made of tin-plate, those for tea-kettles of cast-iron.

For enamelling of cast hollow-ware a patent was taken out in England as early as 1799; but the process then introduced, in which the enamel contained lead and tin, was ultimately abandoned. A subsequent patent has been more successful. The enamel is applied to the cast-iron in two coatings, one of which forms the body of the enamel, and the other the glaze, both being free from metallic oxides. It is especially desirable to avoid the oxide of lead, as it does not resist the action of acid substances in culinary operations. As iron, in common with most metals, differs

from any vitreous enamel in the rate of its expansibility by heat, there is of course a difficulty in securing the permanent adhesion of the two substances, especially with such an article as a cooking-vessel. In cast-iron vessels the difficulty has been practically overcome.

With regard to the comparative merits of the different varieties of hollow-ware, there is no doubt that the kind made of enamelled cast-iron is, on the whole, the best for cooking purposes, though it is about one-fifth dearer than when merely tinned, and is, moreover, not liked by cooks for any but small-sized vessels, on account of its being somewhat heavy. Enamelled wrought-iron cooking-vessels are much lighter to handle, but upon them the enamel does not stand nearly so well, probably because the comparatively rapid heating of the thin iron of which they are made, more rapidly destroys the adherence of the two substances. A great deal of cast-iron tinned hollow-ware is now made without being turned, an omission easily detected.

HOLLS, *hōlz*, George Frederick William, American lawyer and statesman: b. Zelienople, Pa., 1857, July 1; d. Yonkers, N. Y., 1903, July 23. He was graduated from Columbia in 1878, and from the law school there two years later. He was admitted to the bar and established a large law practice in New York city, becoming senior member of the firm of Holls, Wagner & Burghard; in his later life he visited Europe frequently and became widely known there, especially in Germany where he established a branch of his law firm. He was prominent in philanthropic work, being for years an officer of the Legal Aid Society and a director of the Charities Organization Society. He was also an active member of the Republican party. In 1893 he was delegate-at-large to the New York Constitutional Convention, where he was chairman of the committee on education, a member of the committee on cities, and author of several amendments. At the time of the Hague Conference he was very influential in arousing interest and obtaining a large delegation from the United States. He was secretary of the American delegation at the Conference (1899), was the American member of the committee which drafted the arbitration treaty, and author of the clause on 'Special Mediation.' He was afterward appointed a member of the permanent international court of arbitration. A few months before his death President Roosevelt asked him to umpire the adjustment of claims between Germany and England and Venezuela, but he declined. He wrote: *Sancta Sophia and Troitza* (1888); *Compulsory Voting* (1891); and *The Peace Conference at the Hague and its Bearings on International Law and Policy* (1900).

HOLLY, n. *hŏl'lĭ*, called also the Holm [AS. *holegn;* OE. *hollen;* W. *celyn;* Gael. *cuilionn*, holly], (*Ilex*): genus of trees and shrubs of nat. ord. *Aquifoliaceæ*, natives chiefly of temperate climates; with evergreen, leathery, shining, and generally spinous leaves; small flowers which have a 4–5-toothed calyx, a wheel-shaped 4–5-cleft corolla, 4 or 5 stamens, and the fruit globose and fleshy, with 4 or 5

stones (*nuts*). The COMMON HOLLY (I. *aquifolium*), the only European species, and native also of parts of Asia, is a well-known ornament of woods, parks, and shrubberies in Britain, the stiffness of its habit being so compensated by the abundance of its branchlets and leaves, as to make it one of the most beautiful evergreens. It attains greater size and luxuriance in the northern than in the southern parts of its geographic range, often appearing in the former as a tree 20 to 50 ft. high, while in the latter it is generally a mere bush. It prefers light soils. There are numerous varieties of holly, produced, or perpetuated, by cultivation, exhibiting great diversity in the leaves, of which the *Hedgehog Holly* may be mentioned as extremely sinuous and spinous, while others are prized for their color, golden, silver-blotched, etc. The flowers of the holly are whitish, axillary, nearly umbellate; the fruit small, scarlet, rarely yellow or white. The abundance of the fruit adds much to the ornamental character of the tree in winter, and affords food for birds; but to man it is purgative, emetic, and diuretic, and in larger quantities poisonous. The leaves are inodorous, have a mucilaginous bitter and somewhat austere taste, and have been used medicinally in cases of gout and rheumatism, as a diaphoretic, and also as an astringent and tonic to correct a tendency to diarrhea, etc. The leaves and small branches, chopped, are sometimes used for feeding sheep in severe winters. The root and bark are emollient, expectorant, and diuretic. Bird-lime (q.v.), is made from the inner bark. The wood is almost as white as ivory, very hard and fine-grained, and is used by cabinet-makers, turners, musical-instrument makers, etc., and sometimes for wood-engraving. Handles of tools and handles of metal tea-pots are often made of it. The holly is often planted for hedges, as it bears clipping well, and makes an excellent fence. A holly hedge may either be kept low, or allowed to grow to the height of 20 or 30 ft. In the gardening of former days, hollies were often clipped into fantastic shapes.—The name holly is said to be derived from the use of the branches and berries to decorate churches at Christmas, from which the tree was called Holy Tree.—Numerous other species of holly are found in N. America, most of them in swampy situations; among these are the Inkberry, and the American Black Alder or Winterberry, also a species nearly resembling the English. Others are found in S. America, Nepaul, Japan, and other parts of the world.—MATE (q.v.), or *Paraguay Tea*, is the leaf of a S. American species of holly. (I. *Paraguensis*).

HOLLYHOCK, n. *hŏl'lĭ-hŏk* [AS. *hoc;* W. *hocys*, mallows, and *holly*—so called from being supposed to have been first brought from the Holy Land], (*Althæa rosea*): plant of nat. ord. *Malvaceæ*, commonly referred to the same genus with the Marsh Mallow (q.v.). It has a tall, straight, hairy stem; heart-shaped, crenate, wrinkled, 5–7 angled leaves, and large axillary flowers, almost without stalks; the leaves diminishing into bracts, and the upper

part of the stem forming a spike; the petals hairy at the base. The hollyhock is a native of India, s. Europe, etc., is in almost every garden in India, and has been much cultivated in gardens in Britain from a very early period. At present, it is a favorite flower in Britain and America; and varieties, the result of cultivation, are very numerous. It varies much in color of flowers, and double and semi-double varieties are common. It is an autumnal flower, continuing till the frost sets in. It is a biennial or perennial plant. The stem rises to a height of 8–15 ft., unbranching, or nearly so. The fibres of the plant have been made into yarn, but it is not yet certain if it is really valuable for cultivation on this account, or for the manufacture of paper. It is probable that it might be cultivated with advantage to afford green fodder for cattle, which are very fond of its leaves, and the leaves are produced in great abundance if the plant is prevented from flowering. The flowers are mucilaginous and demulcent, and are sometimes used like those of mallows and marsh mallows. The leaves yield a fine blue dye —The CHINESE HOLLY (*A. Chinensis*) is an allied species.

HOLLY SPRINGS: town in n. Mississippi, on the Central railway, 25 m. s. of its junction with the Memphis and Charleston line. It is the principal town in n. Mississippi, and contains several churches, four academies, a bank, and two or three newspapers, with a large trade in cotton and merchandise. Pop. 3,000.

HOL'LY WA'TER-WORKS. See WATER SUPPLY.

HOLM, n. *hōlm* or *hōm* [AS. *holen*, holm or alder-tree (see HOLLY)]: the evergreen oak; the *Quercus ilex*, ord. *Cūpŭlĭfĕræ*, or *Corylācĕæ;* also a name given to the *holly*.

HOLM, n. *hōlm* or *hōm*, spelled also HOLME—generally when part of a compound word [Norw. *holm*, a small island: Icel. *holmr*, an islet: Dan. *holm*, a holm, a quay; Dut. *holm*, a sand-bank: AS. *holm*, the deep sea]: a slight elevation, or a rising ground; a river islet; generally applied to low flat rich land on the banks of a river.

HOLMES, *hōmz*, ABIEL, American Unitarian clergyman and annalist: b. Woodstock, Conn., 1763, Dec. 24; d. Cambridge, Mass., 1837, June 4. He was graduated at Yale College in 1783, and became subsequently a tutor in the college, pursuing at the same time his theological studies. In 1785 he was settled over a parish at Midway, Ga., where he remained till 1798. Returning north he became pastor of the first parish in Cambridge, and continued to fill the office till 1832, Sept. 26. Besides publishing a *Life of President Stiles* in 1978, he was the author also of *Annals of America* (1805), which gave him a high reputation for care and accuracy. It was republished in England in 1813. He contributed frequently to the collections of the Massachusetts Historical Society, in Vol. XXVII. of which will be found a complete list of his publications.

HOLMÉS, *ō-mĕs'*, AUGUSTA MARY ANNE, French com-

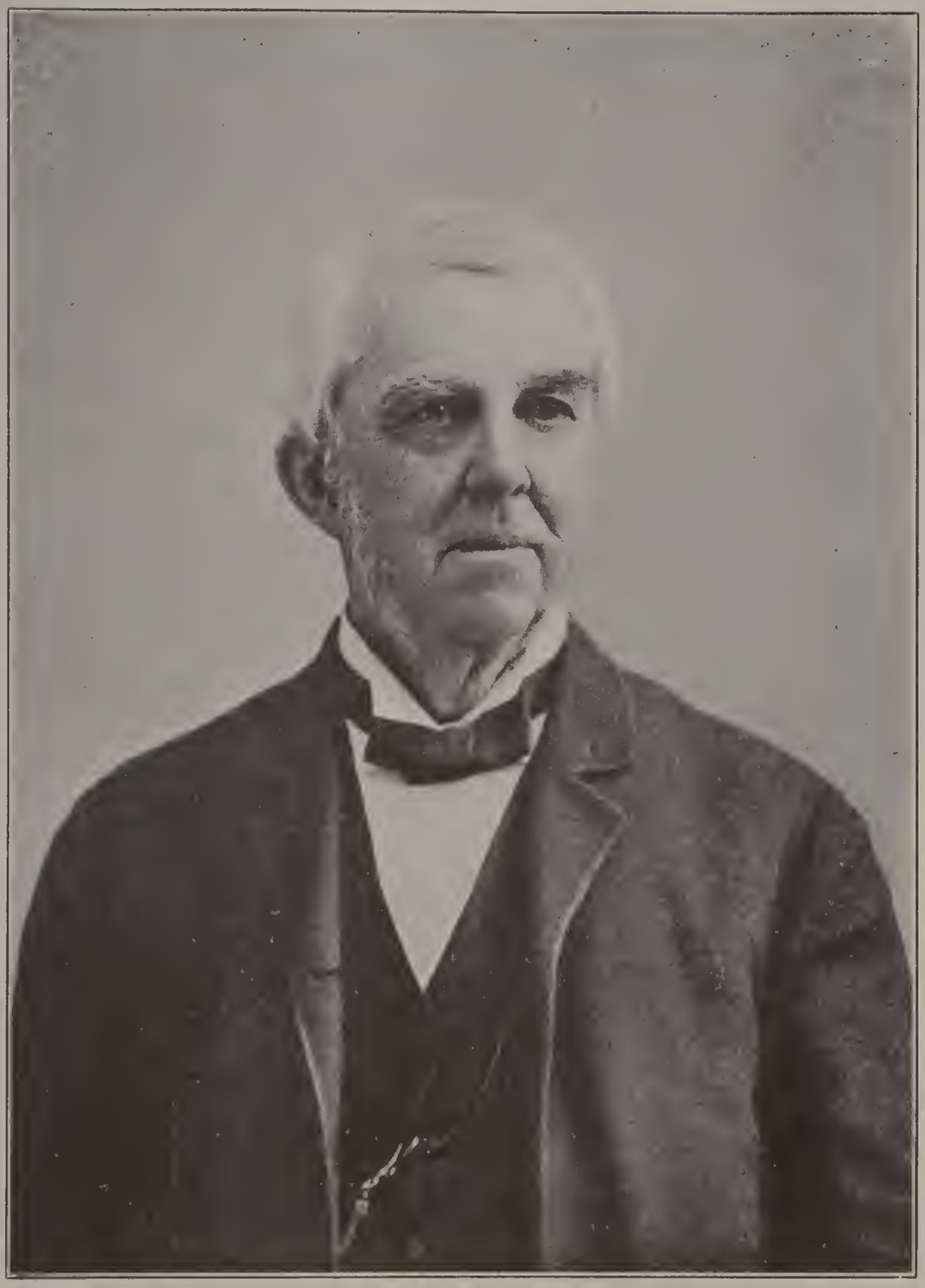
poser: b. Paris 1847; d. there 1903, Jan. She studied composition with Lambert, Klose, and César Franck, and began her career as a pianist. Her first work of magnitude was a setting of the psalm *In Exitu* sung for the first time in 1873. She later wrote considerable music, including 100 songs, characterized by much grace of expression. In the larger forms her compositions include the well-known symphony *Hero et Léandre;* three other symphonies, *Lutèce*, which in 1879 won third prize in an open competition directed by the Paris municipality. *Les Argonautes* and *Irlande;* the symphonic poems, *Les Sept Ivresses; Roland, Pologne, Au Pays Bleu;* an ode of triumph, *Patrie;* a four-act lyric opera, *Le Montagne Noire* (Grand Opera 1895), and an allegorical cantata, *La Vision de la Reine.*

HOLMES, Burton, American traveler and lecturer: b. Chicago, 1870, Jan. 8. After a secondary education at Chicago he traveled in all the countries of continental Europe, as well as in Japan, Algeria, Tunis, Morocco, Corsica, Greece, and Thessaly, Hawaiian Islands, the Yellowstone Park, the Grand Cañon of the Colorado, the Philippines, and China. About 1890 he became known as a platform lecturer, giving in popular form the results of his observations. In 1907 he published the *Burton Holmes Travelogues.*

HOLMES, Mary Jane Hawes, American novelist: b. Brookfield, Mass.; d. there 1907, Oct. 7. She was married to Daniel Holmes, a lawyer of Brockport, N. Y., where she has since resided. She has published many volumes of domestic fiction which had have an extraordinarily wide circulation but in which the literary element is slight. Among her novels are: *Tempest and Sunshine* (1854) (perhaps the best known of them all); *Lena Rivers* (1856); *Marian Gray* (1863); *Milbank* (1871); *Queenie Hetherton* (1883).

HOLMES, Nathaniel, American jurist and Shakespearian scholar: b. Peterboro, N. H., 1815, Jan. 2; d. Cambridge, Mass., 1901, Feb. 26. He was graduated from Harvard in 1837 and after admisison to the bar in 1839 began to practice in St. Louis. He was judge of the supreme court of Missouri 1865–9, and Royal professor of law at Harvard 1868–72. He retired from his profession in 1883 and henceforth devoted himself to study and authorship. He was a strong believer in the Baconian theory of the origin of Shakespeare's plays, which he defends in his work, *The Authorship of Shakespeare* (1866). In 1888 he published *Realistic Idealism in Philosophy Itself.*

HOLMES, Oliver Wendell, M.D., LL.D., physician, author: 1809, Aug. 29–1994, Oct. 7; b. Cambridge, Mass., 3d son of Abiel Holmes, D.D. (1763–1837), who for 40 years was pastor of the first Congl. Church, Cambridge. Holmes graduated at Harvard College 1829, and entered on the study of law, but soon adopted the profession of medicine. He studied in Europe, graduated M.D. 1836, and



OLIVER WENDELL HOLMES.

two years afterward was appointed prof. of anatomy and physiology in Dartmouth College; and 1847, was transferred to the same chair at Harvard, the medical department of which is at Boston. This post he resigned 1882. On the establishment of the *Atlantic Monthly*, 1857, he become one of its first contributors, and has written for it ever since—many of his most popular works being first published in that magazine. He was distinguished as an anatomist and for his researches in microscopy and auscultation; but beyond medical and scientific circles he is revered for his voluminous writings, which comprise nearly every form of literature. Whether he allowed free play to his quaint humor, deep pathos, or sturdy practical wisdom, he wrote and spoke in simple language and with a remarkable charm of presentation. His poems and addresses on special occasions—usually familiar or semi-confidential in tone—are widely acknowledged as models of English linguistic purity. Though for many years a popular lyceum lecturer, his choicest works in prose and verse were originally written for college commencements or college literary societies. He began writing verse while a Harvard student, contributing to his class paper, and reciting an original poem at commencement. The year after his graduation, under the inspiration of a movement to break up the famous old frigate *Constitution*, he wrote the thrilling protest *Old Ironsides*, and while studying law many humorous poems, e.g. *Evening by aTailor* and *The Height of the Ridiculous*. He published his first collection of poems (45) in the year of his graduation in medicine. In the next two years he gained two Boylston prizes with medical essays (pub. Boston 1838). From that time till he joined the *Atlantic Monthly* staff he published an edition of Marshall Hall's *Theory and Practice of Medicine*, in conjunction with Dr. Jacob Bigelow (1839), *Lectures on Homœopathy and its Kindred Delusions* (1842); *Report on Medical Literature*, in the *Transactions* of the National Medical Assoc. (1848), and *Puerperal Fever as a Private Pestilence* (1855). His other scientific works are *Currents and Counter-Currents in Medical Science* (1861); *Border-Lines in some Provinces of Medical Science* (1862), and *Medical Essays*, a re-issue of some of the preceding (1883). Of his succeeding volumes of poetry *Urania* appeared 1846, *Astræa: The Balance of Illusions* 1850, *Songs in Many Keys* 1861, *Songs of Many Seasons* 1875, and *The Iron Gate* 1880. His first contribution to the *Altantic Monthly* was a series of social, colloquial essays, interpersed with poems, entitled *The Autocrat at the Breakfast Table* (in book form 1859). This was followed by a similar series, *The Professor at the Breakfast Table* (book 1860), and after an interval of nearly a quarter of a c., by the concluding series, *The Poet at the Breakfast Table* (book 1872). Two novels also were published during this period, *Elsie Venner: a Romance of Destiny*, 2 vols. (1861), and *The Guardian Angel*, 2 vols. (1868). A collection of magazine essays, *Soundings from the Atlantic*, was published 1864, *Mechanism in Thought and*

Morals 1871, memoirs of John Lothrop Motley 1879 and Ralph Waldo Emerson 1884, *A Mortal Antipathy* 1885, *Hundred Days in Europe* 1887; *Over the Teacups* (1891).

HOLMES, Oliver Wendell, Jr.: lawyer: b. Boston, 1841, Mar. 8: son of Oliver Wendell Holmes, M.D., LL.D. He studied at Harvard Univ., entered the Union army as lieut. 20th Mass. inf., 1861; was wounded at Ball's Bluff, Antietam, and the second Fredericksburg; promoted capt., on Gen. Sedgwick's staff and the gen. staff of the 6th corps, mustered out of the service 1864, June. After a European tour he studied law, was admitted to the bar 1866, and appointed professor in the Harvard Law School and a justice of the Mass. supreme court 1882; was made chief justice of the Mass. supreme court, 1899, Aug. 2; and associate justice of the U. S. Supreme Court, 1902, Aug. 11. He published an edition of Kent's *Commentaries* (1873), and *The Common Law* (1881).

HOLMES, William Henry, American geologist: b. Harrison County, Ohio, 1846, Dec. 1. He was graduated at the McNeely Normal College in 1870, in 1872 was made an assistant on the United States geological survey, and in 1880–9 was a geologist on the survey. In 1889–98 he was archæologist to the United States bureau of ethnology, directing explorations, and in 1894–8 also curator of anthropology in the Field Columbian Museum of Chicago, and professor of anthropic geology in Chicago University. In 1898 he was appointed head curator in the department of anthropology in the United States National Museum. His chief works are: *Archæological Studies among the Cities of Mexico* (1895); and *Stone Implements of the Potomac-Chesapeake Tidewater Province* (1897).

HOLOBLASTIC, a. *hŏl'ō-blăs'tĭk* [Gr. *holos*, whole; *klastos*, a sprout, a bud]: applied to an ovum whose vitellus becomes entirely segmented. See Meroblastic.

HOLOCAN'THUS: genus of fishes, of family *Chætodontidæ* (q.v.); remarkable for the great beauty and symmetry of their colors, and for excellence as food. They have the very compressed form and other general characters of the *Chætodontidæ*, a single dorsal fin, and a large spine on the gill-cover. They are natives of the seas of warm climates. *H. imperator* is one of the most esteemed fishes of the E. Indies, rivalling the salmon in flavor. Its greatest size is about 15 inches long; its color is deep blue, with numerous narrow bands of orange; the pectoral fins are black, the tail is bright yellow. It is known in parts of the East as the *Emperor of Japan*.

HOLOCAUST, n. *hŏl'ō-kawst* [Gr. *holos*, whole; *kaustos*, burnt: F. *holocauste*]: sacrifice or offering the whole of which was consumed by fire; a burnt-offering; see Sacrifice.

HOLOCEPHALI, n. plu. *hŏl'ō-sĕf'ă-lī* [Gr. *holos*, whole *kephalē*, the head]: in *zool.*, a sub-order of the Elasmobranchii, *ĕ-lăs'mō-brăng'kĭ-ī*, comprising the Chimæræ.

HOLOFER'NES. See JUDITH.

HOLOGRAPH, n. *hŏl'ō-grăf* [Gr. *holos*, whole; *graphō*, I write]: deed or will written wholly by the hand of the grantor or testator: ADJ. applied to a written document or letter, written as well as signed by the same person; also HOL'OGRAPH'IC, a.-*ĭk*. In Scotland, and in France, considerable privileges pertain to legal documents thus written: such exceptional privileges are unknown in England and in the United States.

HOLOHEDRAL, a. *hŏl'ō-hē'drăl* [Gr. *holos*, whole; *hedra*, a seat]: in *min.*, completely developed; symmetrical, the opposite of HEMIHEDAL.

HOLOMETABOLA, n. *hŏl-o-mĕ-tăb'o-la* [prefix *holo-*; Gr. *metabolē*, change]: in *entom.*, sub-class of insects consisting of those which undergo a complete metamorphosis, the larva, pupa, and perfect insect being unlike each other. HOLOMETABOLIC, a.

HOLOMETER, n. *hŏl-ŏm'-ĕtĕr* [prefix *holo-*; Gr. *metron*, a measure]: instrument for taking all sorts of measurements; a pantometer.

HOLOPHANEROUS, a. *hŏl-o-făn'ĕr-ŭs* [prefix *holo-*; Gr. *phaneros*, visible]: term applied to the metamorphoses of insects when they are complete.

HOLOPHOTAL, a. *hō-lŏf'ŏ-tăl* [Gr. *holos*, whole; *phōs*, light, *phōtos*, of light]: applied to reflectors which throw back the rays of light in one unbroken mass without perceptible loss.

HOLOPHRASE, n. *hŏl'o-frāz* [Gr. *holos*, the whole; *phrazō*, I tell]: in any language, a whole phrase, or long number of syllables, employed to express a simple idea, which in English is expressed by one word. HOLOPHRASTIC, a. *hŏl'ō-frăs'tĭk*, applied to those languages which have numerous syllables in a single word, often as many as fourteen.

HOLOPTYCHIUS, n. *hŏl'ŏp-tĭk'ĭ-ŭs* [Gr. *holos*, whole entire; *ptūchē*, a wrinkle]: remarkable genus of fossil ganoid fishes, so named from the wrinkled appearance of the enamelled scales. They were of large size, some species probably reaching the length of 12 ft. The small head was covered with large tuberculated plates, like those of the crocodile, and the body was completely encased in large scales, more like those of a reptile than a fish. Some scales have been found measuring 3 inches in length by 2½ in breadth, and a full eighth of an inch in thickness. They were composed internally of porous bone, in numerous layers, arranged alternately at right angles to each other, and the outside was covered with a bright glossy corrugated enamel. The spines of the fins were large and hollow; the bones partially ossified; the centre remained in its original cartilaginous condition, and consequently appears hollow in the fossil. The jaws were covered with hard enamel instead of skin, and were furnished with a double row of teeth; the outer row, placed along the edge of the mouth,

were small and closely set; the inner range widely set, and very large, at least 20 times the bulk of the others.

The genus is peculiar to the Old Red Sandstone and Carboniferous Measures; eight species being found in the former, and nine in the latter. The name Holoptychius is now generally confined to the fossils of the Old Red Sandstone, and that of the Rhizodus, which Owen applied to the teeth remains before their connection with the fish was known, has been given to the Holoptychians of the Coal Measures, which had the outer row of teeth more robust and obtuse, and the inner set longer, sharper, and more slender than in the older species.

HOLOSERICEOUS, a. *hŏl'ō-sĕr-ĭsh'ŭs* [Gr. *holos*, whole; *sērĭkŏs*, L. *sērĭcus*, silky]: covered with minute silky hairs, best discovered by touch.

HOLOSTOMATA, n. plu. *hŏl'ŏ-stŏm'ă-tă* [Gr. *holos*, whole; *stŏma*, the mouth, *stŏmăta*, mouths]: a division of gasteropodous mollusks in which the aperture of the shell is rounded or entire.

HOLOTHURIA, n. *hŏl'ō-thū'rĭ-ă* [Gr. *holos*, the whole; *thŭrĭŏn*, a little door]: genus of *Echinodermata* (q.v.), the former limits of which are now those of a family, *Holothuridæ*, divided into numerous genera. Sea-slug and Sea-cucumber are popular names of some animals of this family. The *Holothuridæ* have not the covering of calcareous plates characteristic of the more typical *Echinodermata*, but a soft leathery muscular integument, very irritable, and capable of great distention and contraction. Some are almost globose, some so much elongated as to be almost worm-like; but the same individual is often capable of extending itself to several times the length which it has in a state of repose. In locomotion, the body is extended and contracted as by the annelides, but the principal organs of locomotion, as in star-fishes and sea urchins, are suckers or *Ambulacra* (q.v.), of which there are usually five double rows, while sometimes they are distributed over the whole surface of the body; but some of the species have the suckers developed only on a disk, and the body then presents an upper and an under surface. The radiate structure is most apparent in the mouth, which is surrounded with tentacles, in number always a multiple of five, showing great variety of beautiful forms, and capable of being completely retracted. Little is known of the food of the *Holothuridæ*, which, however, probably consists of small marine animals. Within the opening of the mouth there is a circle of teeth. There is no proper stomach. The intestine is often very complicated. The respiratory organs are near the anus, and consist of branching tubes. The organs of both sexes are found in each individual. The young pass through several stages or transformations, in which they are very unlike their parents; in their first stage, after leaving the egg, they swim vigorously, by means of membraneous expansions of the body. The *Holothuridæ* are capable of most extraordinary reproduction of parts, even of the most important organs. They are found in all seas, but particu-

larly abound in the Red Sea, and between s. Asia and Australia. The largest European species, *H.* (*Cucumaria*) *frondosa*, is about 12 inches in length, and capable of extending itself to 3 ft. Many species are small, and they are not of pleasing appearance as they usually come under observation, though the expanded tentacles give them beauty in their proper abodes. But many of the tropical species exhibit splendid colors, and are among the creatures which make the bottom of the sea, particularly among coral reefs and islands, gay and brilliant as a garden.

The *Bêche-de-mer* (q.v.), or Trepang, so much esteemed as a delicacy by the Chinese, belongs to this family. HOL'-OTHU'RIA, or HOL'OTHU'RIAN, a. pertaining to. HOL'-OTHU'RIOI'DEA, n. *-ĭ-ŏy'dē-ă* [Gr. *eidos*, resemblance]: an order of Echinŏdermăta.

HOLPEN, pp. of v. *hōl'pn:* in *Scrip.*, an old spelling for *helped*.

HOLST, HERMANN EDUARD VON: historian: b. Fellin, Livonia, Russia, 1841, June 19; d. Freiburg, Germany, 1904, Jan. 20. He was educated in Dorpat and Heidelberg universities; took a doctor's degree at the latter 1865; settled in St. Petersburg 1866; travelled in Italy, France, and Algeria, and published a political pamphlet for which he was forbidden to return to Russia; removed to the United States and became asst. editor of the *Deutsch-Amerikanisches Conversasions-Lexicon* 1869; appointed prof. of history in Strasburg Univ. 1872 and of modern history in Freiburg Univ. 1874; revisited the United States, delivered a course of lectures in Johns Hopkins Univ., and declined a professorship there 1878; and accepted the chair of hist. in Univ .of Chicago 1982. He wrote *The Constitutional and Political History of the United States*, 1750–1833 (American ed. 5 vols., Chicago 1876–85), *Life of John C. Calhoun* (American statesman series, Boston 1882); *The Constitutional Law of the United States of America* (Chicago 1887); etc.

HOLSTEIN, *hōl'stīn:* formerly a duchy belonging to Denmark, and at the same time a member of the Germanic Confederation; annexed 1866 to Prussia. It is separated from Slesvig on the n. by the river Eyder and the Slesvig-Holstein canal; is bounded e. by the Baltic Sea, the territory of Lübeck, and the duchy of Lauenburg; s. by the Hamburg territory and the river Elbe, which separates it from Hanover; and w. by the North Sea; 3,270 sq. m. The principal rivers, besides the Elbe and the Eyder, are the Stör and the Trave. Of the surface of the land, one-eighth consists of marshes. The central districts of the province are occupied by an undulating plain, varied by low hills, and traversed from n. to s. by a heathy and sandy ridge, from which the land falls away gradually on the e.—where the surface is varied by lakes and fertile well-wooded valleys—and on the west. The soil, with the exception of several tracts of sand and heath, is very fruitful, and most luxuriant in the marshes. The climate and

natural productions closely resemble those of similar districts in n. Germany. Salt and lime are the only minerals found. Amber is obtained on the e. coast, and the interior abounds in peat. The manufactures of Holstein are inconsiderable; agriculture and the rearing of cattle are the chief employments of the people. For the history of Holstein and its political relations, see SLESVIG. Pop. (1900) 1,387,968.

HOLSTER, n. *hōl'stėr* [Dut. *holster*, a case for pistols: AS. *heolster*, a hiding-place—from *helan*, to cover: Icel. *hulstr*, a case or sheath—from *hylja*, to cover]: a leather case for a pistol attached to the forepart of a saddle; frequently covered with wool or fur, to prevent injury to the rider if he is thrown forward upon it. HOL'STERED, a. *-stėrd*, furnished with holsters.

HOLSTON, *hŏl'ston*, RIVER: affluent of the Tenn. river, rising by n. and s. forks in the Allegheny Mountains in Smyth co., Va., uniting near Kingsport, Tenn.; flowing 200 m. s.w. to Kingston, Tenn.; and there joining the Clinch river in forming the Tenn. river. It is navigable for steamboats in all seasons to Knoxville and in winter to Kingsport, and is fed by the French Broad, Little Tenn., and Watauga rivers.

HOLT, n. *hōlt* [AS. *holt*, a grove: Icel. *holt*, a copse: Dut. *hout*, a wood]: a wooded hill; a forest; a cover, hole, or other place of security.

HOLT, *hōlt*, JOSEPH: lawyer: b. Breckenridge co., Ky., 1807, Jan. 6; d. Washington, D. C., 1894, Aug. 1. He received a collegiate education; began practicing law in Elizabethtown, Ky. 1828; removed to Louisville 1832, Port Gibson, Miss., 1835, and Louisville 1842; appointed by Pres. Buchanan commissioner of patents 1857, postmaster-gen. 1859, and (on the resignation of John B. Floyd) sec. of war 1860, Dec.; became judge-advocate-gen. of the army and col. 1862, Sep. 3; promoted brig.-gen. and made chief of the bureau of milit. justice 1864; brevetted maj.-gen. U.S.A. 1865, Mar. 13; and retired at his own request 1875, Dec. 1.

HOL'TON, Kan., city, county-seat of Jackson County; on the Missouri P., the Chicago, R. I. & P., and the Union P. R.R.'s; about 28 miles north of Topeka and 30 miles west of Atchison. It was settled in 1859 and received its charter in 1870. It is situated in a section noted for good farms. The chief manufactures are flour, wagons, cigars, creamery products, and planed lumber. Its trade is chiefly in wheat, corn, hay, live-stock, and local manufactured products. The government is vested in a mayor, who holds office two years, and a common council. Pop. 3,150.

HÖLTY, *hel'tĭ*, LUDWIG HEINRICH CHRISTOPH, German lyric poet: b. Mariensee, near Hanover, 1748, Dec. 21; d. Hanover, 1776, Sep. 1. In 1769 he went to Göttingen to study theology. Here, falling in with Bürger, Voss, the Stolbergs, and other poets of kindred tastes, he became one

of the founders of the Gottingen 'Hainbund.' This league of young enthusiasts was aflame for Klopstock, then considered the greatest German poet for patriotism and for friendship, detested Wieland's sensual poems and his Frenchified manner, read the classics together. and wrote poetry in friendly emulation. Hölty's poems reveal a lovable personality. The strain of sentimentality that runs through all his work is not affectation, as it was with so many of the younger poets of that age in which Rousseau had made sentimentality fashionable, but the true expression of his nature. His range was small; but within its limits his work was excellent, and many of his songs have become the common property of the people. Consult: Voigt, *Hölty, ein Roman* (1844); Reute, *Hölty, Sein Leben und Dichten* (1883).

HOLTZENDORFF, *hōlts'en-dawrf*, FRANZ VON: jurist: 1829, Oct. 14—1889, Feb. 14; born in the n. of Brandenburg. Educated for the law, he practiced in the courts at Berlin till 1857, when he became a lecturer on law at the university. He was made prof. there 1861, and was called to Munich 1873. He was known as an author on several branches of law, especially in connection with labors for the reform of penal codes and penal systems. In 1880 he took part in the proceedings of the Social Science Congress at Edinburgh. Among his numerous works, are *Die Deportation als Strafmittel* (1859); *Die Principien der Politik* (1869); *Encyclopädie der Rechtswissenschaft* (2d ed. 3 vols. 1876); *Handbuch des Deutschen Strafrechts.*

HOLY, a. *hō'lĭ* [Icel. *heilagr*, holy—from *heil*, whole; Ger. *heilig;* Dut. *heylig*, holy—from Ger. *heli;* Dut. *heyl*, *health*]: pure; good; pious; free from sin and sinful affections; sacred; perfect in a moral sense; consecrated to. HO'LILY, ad. *-lĭ.* HO'LINESS, n. *-nĕs*, state of having the desires and affections sanctified; the quality of being holy; freedom from sin. HOLIDAY, n. *hŏl'ĭ-dā*, a day of joy or amusement, etc.: see HOLIDAY (above). HOLY CITY, the city which stands most connected as the origin and source of a religious system, as Jerusalem to Jews and Christians HOLY LAND: see PALESTINE. HOLY ONE, one of the names of the Supreme Being; a name of Christ. HOLYROOD n. *hō'lĭ-rôd*, a crucifix in the R. Cath. Chh. placed over the entrance to the chancel; *hŏl'ĭ-rûd*, the royal palace, etc., at Edinburgh. HOLY OF HOLIES, n. *hō'lĭz*, the innermost division of the tabernacle and temple where the ark was kept. HOLY DAY, a religious feast: see HOLIDAY. HOLY OFFICE, a name for the Inquisition. HOLY ORDERS, in *Episcopal Churches*, the several ranks of the ministry. HOLY THURSDAY, Ascension day, ten days before Whitsuntide. HOLY WEEK, the week before Easter; Passion week, strictly the week before Holy week: see HOLY WEEK, HOLY WRIT, the Sacred Scriptures. HOLY LAND, Palestine, the country of the anc. Jews. HOLY GHOST: see HOLY SPIRIT.—HOLY STONE, a stone used by seamen to scrub and clean the decks of ships: V. to scrub the deck of a vessel with a holy-stone. HOLY WAR, a war under-

taken with the view of crushing the enemies of the church—usually restricted to one of the crusades.—SYN. of 'holy': religious; devout; hallowed; pure; guiltless; irreproachable; consecrated; immaculate.

HOLY ALLI'ANCE, league formed after the fall of Napoleon by the sovereigns of Russia, Austria, and Prussia, nominally to regulate the relations of the states of Christendom by the principles of Christian charity, but really to preserve the power and influence of the existing dynasties. Most of the other European rulers acceded to it, and the treaty was formally made public in the *Frankfurt Journal*, 1816, Feb. 2. It was in virtue of this league that Austria, 1821, crushed the revolutions in Naples and Piedmont, and that France, 1823, restored absolutism in Spain. Subsequently, both France and England seceded, after which it became a mere *nominis umbra*. A special article of the treaty excluded forever the members of the Bonaparte family from any European throne.

HO'LY COAT OF TREVES: relic preserved with the greatest reverence in the cathedral of Treves, of which city it is esteemed the greatest treasure. It is alleged to be the seamless coat of the Lord Jesus, and to have been discovered in the 4th c. by Empress Helena in her memorable visit to Palestine, and by her deposited at Treves. The Treves relics were concealed from the Normans in the 9th c. in crypts; but the Holy Coat was rediscovered 1196, and then solemnly exhibited to the public gaze, which did not take place again until 1512, when Leo. X. appointed it to be exhibited every seven years. The Reformation and wars prevented the observance of the festival; but it was attended 1810 by 227,000 persons; and 1844 and 1891 by still greater multitudes, while miraculous cures were said to be performed. The exhibition of the Holy Coat 1844 led to the secession of the German Catholics from the Catholic Church.

HO'LY COMMUNION, SISTERS OF THE: first Prot. Episc. sisterhood organized in the United States, founded by William A. Muhlenberg, D.D., in New York 1852, and named after the church of the Holy Communion, which was erected by his sister and of which he became rector 1846. After he had secured the establishment of St. Luke's Hospital in New York (opened 1859), these sisters took charge of its humane work and also labored among the poor. They are not required to take vows nor to wear a special habit.

HO'LY FAM'ILY: name in art for every representation of the infant Savior and his attendants. In the early part of the middle ages, when the object in view was to excite devotion, the Virgin and Child were usually the only persons represented. At a later period, Joseph, Elizabeth, St. Anne (mother of the Virgin), and John the Baptist, were included. Some of the old German painters have added the 12 apostles as children and playfellows of the infant Christ, as well as their mothers, as stated in the

legends. The Italian school, with its fine feeling for composition, was the first to recognize of how many figures the group must consist, if the interest is to remain undivided, and be concentrated on one figure, whether that figure be the Madonna or the Child. Two masters are preeminent in this species of representation—Leonardo da Vinci and Raphael.

HO'LY FIRE, in the Catholic Church: light kindled at Easter, by sparks struck from a flint, in remembrance—according to the missal—of Christ as the great corner-stone, and hailed by kneeling ecclesiastics with the words 'Light of Christ' (*Lumen Christi*). The ceremony takes place on Holy Saturday, of which day's service it forms a striking part; and at Rome, it takes place in the presence of the pope himself; all the lights in the chapel having been previously extinguished, to be rekindled at the new fire.—The kindling of the Holy Fire in the Church of the Holy Sephulchre at Jerusalem, at the Easter of the Oriental Church, is represented as miraculous. The Greek and Armenian clergy combine on this occasion, and amidst processions, solemnities, an excited multitude, and scenes disgraceful not only to the name of religion but to human nature, the expected fire makes its appearance from within an apartment in which a Greek and an Armenian bishop have locked themselves.

HO'LY GRASS (*Hierochloe borealis*): a grass about 12 inches high, with a brownish glossy lax panicle. It is found in the most northern parts of Britain, and in n. Europe. It has a sweet smell, like that of vernal grass. In some countries, it is strewed on the floors of places of worship on festival-days, whence its name.

HOL'YHEAD ISL'AHD: small island of N. Wales, w. of the island of Anglesea, and forms part of the county of that name. Its greatest length is seven and a half m. and its greatest breadth about three and a half m.: area 9,568 sq. acres; pop. about 10,000. Holyhead Island is separated from Anglesea by a narrow sandy strait crossed by the Holyhead road and the Chester and Holyhead railway, which are formed by embankments or causeways, arched in the centre. The island, which comprises some good pasture ground for sheep, as well as a proportion of arable land, is mostly rocky and barren. On the n.w. coast are two islets, the N. and S. Stacks, the latter with a lighthouse. The Stacks and the n. coast are hollowed out into magnificent caves, the haunt of sea-fowl.

HOLY ISLAND, or LINDISFARNE, *lĭn-dĭs-fârn':* small island of England, belonging to the county of Northumberland, about 10 m. s.e. of Berwick-on-Tweed. It measures 2¼ miles from e. to w., and 1½ from n. to s. At low water it can be reached by wheel-vehicles, and even by pedestrians dry-shod, but at high water the strait is about 1½ m. wide. The village is finely situated on the s. coast of the island, and is guarded by the castle, built about 1500, and still in good repair. The island is interesting for the ruins of its Benedictine priory. This was built 1093, out of the

materials of the ancient cathedral, and was dismantled at the dissolution of the monasteries, when its lands were attached to the cathedral of Durham. Its ruins show that it was a model on a small scale of this cathedral, even to the patterns on the columns. The first church was a rude building erected in the 7th c., under the auspices of Bp. Aidan, and under its shadows a company of monks established themselves under the rule of St. Columbia, and grew into the famous priory of Lindisfarne, which, however, always continued subordinate to its bishop. The island became the luminary of the north, the Iona of England. Successive kings added to its buildings, and enriched it with large revenues. Under the rule of St. Cuthbert (q.v.), as prior, afterward as bishop, it reached its greatest glory. The cathedral suffered severely from the ravages of the Danes, and was gradually allowed to fall into ruins, as Durham grew into importance. It was finally pulled down 1093.

HO'LY MAID OF KENT. See BARTON, ELIZABETH.

HOLYOAKE, *hōl'yōk*, GEORGE JACOB: reformer:b. Birmingham, England, 1817, Apr. 13; d. Brighton, 1906, Jan. 22. He was educated in the local Mechanics' Institution, tutor of mathematics there, prize author of the 5 degrees, I.O.O.F., founder of a system of 'Secularism,' editor of 30 vols. of *The Reasoner*, the last person imprisoned in England for alleged atheism, and the last person indicted for publishing unstamped papers in support of the Soc. for Repealing the Taxes on Knowledge. He made lecturing tours of the United States and Canada 1879 and 82, and did more than any other man to spread the principles of co-operation. He was a vigorous critic of nearly all established institutions; and author of numerous works on working-class education, theol. criticism, politics, and co-operation, including *The Logic of Death; The Logic of Life; The Trial of Theism; Nature and the Origin of Secularism; Thirty-three Years of Co-operation* (1872); *History of Co-operation in England, Its Literature and Its Advocates* (1875); *Among the Americans* (1881); *Self Help One Hundred Years Ago* (1888); *The Co-operative Movement of To-day* (1891); a short, useful account of the history of co-operation; *Sixty Years of an Agitator's Life* (1892); an autobiography; and *Jubilee History of the Leeds Co-operative Society* (1897).

HOLYOKE, *hōl'yōk:* city of Hampden co., Mass., on the Connecticut river, and on the Boston and Maine, and the New York, New Haven and Hartford railroads, 8 m. n. of Springfield, 9 m. s. of Northampton, with which and the surrounding country, including Mounts Holyoke and Tom, it also has electric street railroad communications. The Holyoke Scientific Society is renowned for its native archæological works, and the city has good graded schools, public library, college of music, orphanages, and hospitals, municipal water-works, gas and electric lighting plants. For some years Holyoke was noted for the number and magnitude of its paper mills, which still maintain pre-

eminence although other industries also enrich the city. Its manufactories of paper, especially fine writing paper, are the largest in the country, employing 3,800 persons, and it also has the largest blank-book works in the country. Other manufactures are thread, cotton and woolen goods, knit goods, alpaca, silk, bicycles, automobiles, machinery, wire, belting, screws, etc. Manufactures are capitalized at $26,760,000, and the products are valued annually at $26,284,000, employing 14,100 hands. Prior to 1831 vast water-power on which the city now depends was wholly unused. Holyoke was then a remote border of the town of W. Springfield, inhabited chiefly by farmers. A small cotton-mill was built 1831, and some years afterward a grist-mill. These comprised the business enterprises 1847. In that year the water of the river was found to aggregate 30,000 horse-power by natural descent alone. Capital was attracted and a dam was built which was soon destroyed. In 1849, Oct. the present dam was completed,, and 1868–70 a solid stone and timber apron was built directly on the face of the dam to add to its strength and durability. The water is now distributed through three canals of a total length of 3½ m., with a capacity of 300 mills' power (each mill-power averaging 38 cubic ft. of water per second during 16 hours daily); about equalling the combined water-power of Lowell, Mass., and Manchester, N. H. Holyoke was incorporated as a town 1850, Mar.; chartered as a city 1873, Apr. The charter was revised in 1896 and the government is now vested in a mayor, elected annually, and a city council. Pop. (1910) 57,730.

HOL'YOKE, Mount: in Hampshire co., Mass.; between the towns of Hadley and Amherst on the n. and S. Hadley and Granby on the s.; 1 m. e. of the Conn. river, 3 m. s.e. of Northampton. Mount Holyoke is 7 m. long; its w. extremity is cut by the Conn. river with Mount Tom on opposite side of cleft. It is of greenstone trap, well timbered, 830 to 1,120 ft. above sea-level; has a carriage road and railway operated by a stationary engine leading to the summit of the fashionable (w.) portion, and a commodious hotel built 1821; and has been a popular resort for at least 100 years. It affords a lovely view of the winding Conn. river and the fertile fields and cosy cottages in its beautiful valley.

HOLY ORDERS: the several ranks of the ministry of a church; also the power or authority to exercise that ministry. In the Roman Catholic Church Holy Orders is one of the sacraments and there are seven orders of the ministry, viz.: priesthood, deaconate, and sub-deaconate: these are the greater or sacred orders; and the four minor orders of lector, acolyte, exorcist, and doorkeeper. Usually the episcopate is classed, not as a separate order, but as the completion and extension of the priesthood. Though every candidate for the priesthood is inducted into the four minor orders and the sub-deaconate and deaconate before he receives priestly ordination, it happens very seldom that a man enters any of those inferior orders

intending to remain therein: they are simply steps to the priesthood. In the Oriental churches, both those in communion with the Roman See—as the Greek Uniate, the Maronite, the United Armenian, etc., and those which are separated from Rome by schism or by heresy, the number of orders is less than in the Latin Church: in all the foregoing churches only four orders, or, counting the episcopate as a distinct order, five orders are recognized; those of bishop, priest, deacon, and lector: and of these the first three, at least, are held to be of divine institution and sacramental. By the Anglican Church and the Protestant Episcopal Church of the United States three orders are recognized; those of bishop, priests, and deacons: but in the 25th of the Articles of Religion those orders are expressly declared to be no sacrament. The orders of the Oriental churches are generally recognized as valid by the Church of Rome; and when a priest of any of those churches is received into the Roman Catholic Church he is still regarded as a priest: but an Anglican or a Protestant Episcopal minister enters the Latin Church as a simple layman even though he were in Anglicanism a bishop; for Anglican orders have ever been held by Rome to be invalid. Other Protestant churches, whether episcopal (as the Lutheran) or presbyterial or congregational, do not regard holy orders (or clerical order) as of divine institution or as setting up any essential difference between minister and layman. See CLERGY.

HOLY PHIAL (or SAINTE AMPOULE), ORDER OF: order of knighthood formerly in France, composed of four persons, usually the first in point of rank, family, and fortune in the province of Champagne, and styled *Barons de la Sainte Ampoule.* At the coronation of the French kings, they were delivered to the Dean, Priors, and Chapter of Rheims, as hostages for the fulfilment of the engagements entered into by the great officers of the crown to return the holy phial in which the coronation oil was kept, and which according to the legend, was brought from heaven by the Holy Spirit under the form of a dove, and put into the hands of St. Remy, at the coronation of Clovis. The peculiarity of this order was that the knights were knights for only a day.

HOLY PLACES—HOLY SEPHULCHRE: strictly the group of sacred places of which the Church of the Holy Sephulchre at Jerusalem is the centre, and which are supposed to comprise the sites of the chief events of our Lord's passion, death, and burial: Gethsemane, the Supper-room, the Church of the Ascension, the Tomb of the Virgin, etc. For numerous other localities to which pertain solemn memories and interesting associations, see JERUSALEM; also for the general topography of the ancient and modern city. The so-called Church of the Holy Sephulchre stands within the modern city, on the n.w. or Latin quarter. It is a Byzantine building, in the centre of a spacious inclosed court. Under the great dome of the church stands the Holy Sepulchre, of oblong form, 15 ft. by 10, surmounted by a

rich ceiling, decorated with gold, silver, and precious marble. A circular hall surrounds the space beneath the dome. Around this circular hall are oratories for the Syrians, Copts, and Maronites; and above it is a series of galleries, similarly appropriated. In the body of the church are the chapels of the Greek, Latin, and Armenian Christians, the church as a whole being maintained by the Ottoman authorities in the condition, as it were, of a common meeting-ground for all the Christian communities, as the rivalries of the several religious bodies constantly lead to angry controversy, and sometimes to sanguinary conflicts. Opposite the entrance of the inclosure is a somewhat elevated marble slab, called the Stone of Unction, shown as the stone on which the Lord's body was anointed before entombment; and above is an elevation approached by steps, which is the traditionary Mount Calvary, and on which now stands a rich dome-shaped building, floored with rich marbles, in the crypt of which is the cavity supposed to have been formed by the erection of the cross. The street by which this site is approached, from the direction of the ruins of Herod's palace, on the n. side of the city, is the principal street of the Latin quarter, and is called by the Turks *Harât-el-Albam*, and by the Christians the *Via Doloroso*, as being the supposed route of the Lord Jesus from the hall of judgment to Calvary.

Such is the traditional view as to the locality, not only of these leading events of our Lord's history, but also of many others of minor importance. For a long course of ages, the Christian world unhesitatingly acquiesced in this view of the topography of the Holy Places; but since the beginning of the 18th c. doubts have been entertained as to its correctness; and in late years, the question has been discussed with much learning, though with little conclusive result. About 1730, a German named Korte, who had visited Jerusalem, and explored the locality, published a work, calling the authenticity of the received system of sacred topography into question. The doubts expressed by him have been repeated at intervals ever since his day, especially by the celebrated American critic, Dr. Edward Robinson, author of *Biblical Researches in Palestine*, who may be said, in two successive investigations, to have exhausted the evidence, or one side of the question, at least so far as the remains of the ancient city had at that time been explored. Dr. Robinson distinctly affirms the impossibility of reconciling the received sacred localities with the plain requirements of the gospel history, but he fails himself to point out a scheme of topography which may be substituted for that which has been traditionally received. More recent critics, especially James Ferguson, in an *Essay on the Ancient Topography of Jerusalem*, agreeing with Dr. Robinson in rejecting the received topography, contends against him that the true site of the Holy Sepulchre can be accurately determined, and that it is no other than the Mosque of Omar, or, as the Mohammedans call it, the 'Dome of the Rock.' This he holds to be the identical

church which Constantine erected over the rock which contained the tomb of our Lord. Dr. Stanley, a late biblical traveller in Palestine, left the question undecided. For chief authorities, see on one side, Robinson's *Biblical Researches in Palestine;* Smith's *Dictionary of the Bible,* article 'Jerusalem' (Ferguson); *Essay on the Ancient Topography of Jerusalem,* by the same author. See the other side, William's *Holy City*; Raumer's *Beiträge zur Bibl. Geographie;* Sepp's *Forschung eines Deutschen Reisenden in Jerusalem;* Schaffter's *Aechte Lage des heiligen Grabes.* Under the auspices of the Palestine Exploration Fund, diligent researches are now being made at Jerusalem, and several important discoveries have been announced. See an account of the excavations in *Underground Jerusalem,* by Capt. Warren, R.E. (London 1876).

HO'LY SEP'ULCHRE, KNIGHTS OF THE: order of knighthood instituted, probably by Pope Alexander VI., for the guardianship of the Holy Sepulchre, and the relief and protection of pilgrims. The pope was originally the grand-master, but he subsequently ceded his rights to the Guardian Father of the Holy Sepulchre. The knights must, by the rules of the order, all be of noble descent, they were bound to hear mass daily, to fight, to live, and to die for the Christian faith, etc. In return for these duties, the knights had the most unusual and extraordinary privileges conferred on them; they were exempt from taxation, could marry, and yet possess church property, legitimize bastards, and cut down and bury the bodies of criminals who had been hanged. On the recapture of Jerusalem by the Turks the knights retired to Italy, and settled at Perugia. After a temporary union with the Hospitallers, the order was reconstructed 1814 both in France and in Poland, and is still in existence within a very small circle of knights elected by the Guardian Father from the most respectable pilgrims who come to Jerusalem

HO'LY SPIRIT, or HOLY GHOST: in Orthodox Theology the third personal distinction in the Divine Trinity (q.v.), proceeding from the Father and the Son, yet of one substance, majesty, and glory with the Father and the Son, very and eternal God. His distinct personality is believed to be attested by a multitude of passages in Scripture. One may suffice as specimen: 'But when the Comforter is come, whom I will send unto you fromthe Father, even the Spirit of truth, which proceedeth from the Father, he shall bear witness of me' (John xv. 26). The 'Procession' (q.v.) of the Spirit is the subject of one of the chief differences between the Eastern and the Western or Latin churches. He is essentially a spirit of holiness, and his grand function is to apply to the hearts of men the benefits of Christ's death, to work in them, first, a belief of the truth as it is in Jesus, and then to sanctify them by that truth.

HO'LY WA'TER: in the Rom. Cath., as also in the Greek, Russian, and Oriental churches, water blessed by a priest or bishop for certain religious uses. Water is a fit-

ting natural symbol of purity; and accordingly, in most of the ancient religions, the use of lustral or purifying water not only formed part of the public worship, but also entered largely into the personal acts of sanctification prescribed to individuals. The Jewish law contained many provisions to the same effect; and the Lord Jesus, by establishing baptism with water as the necessary form of initiation into Christian discipleship, gave his sanction to the use, which, from its universal acceptance among mankind, appears to be a relic of the primeval natural revelation. The usage of sprinkling the hands and face with water before entering the sanctuary, prescribed in the Jewish law, was retained, or at least very early adopted, in the Christian church. It is expressly mentioned by Tertullian in the end of the 2d c. And that the water so employed was blessed by the priests we learn, among others, from St. Jerome, and from the apostolical constitutions. Although it is difficult to fix the precise time, it cannot be doubted that the practice of mingling salt with the water is of very ancient origin (see Canon 20, *De Consecr. Dist.* iii.). In the Western Church, there is a solemn blessing of water in the service of Holy Saturday, but the ceremonial is repeated by the priest whenever it may be necessary to replenish the fountain. Instructed Rom. Catholics regard the use of holy water chiefly as a means of suggesting to the mind the necessity of internal purity; and though it is supposed to derive from the blessing a special efficiency for this end, yet this efficacy is held to be mainly subjective and of a character entirely distinct from that ascribed to the sacramental rites of the church. In the reformed churches, the use of holy water is regarded as unscriptural and superstitious.

HO'LY WEEK: week immediately preceding Easter and specially consecrated to the commemoration of the Passion of our Redeemer. In English (and popularly in American) use, it is called also 'Passion Week;' but that name is appropriated, in Roman use, to the week before Palm Sunday. This institution is of very early origin, and the name Holy Week is but one of many by which its sacred character has been described. It was also called the 'Great Week,' the 'Silent Week,' the 'Week of the Holy Passion,' the 'Vacant Week,' the 'Penitential Week.' In the Rom. Cath. Church, the special characteristics of the celebration of Holy Week are increased solemnity and gloom, penitential rigor, and mourning. If any of the ordinary church festivals fall therein, it is transferred till after Easter. All instrumental music is suspended in the churches, the altars are stripped of their ornaments, the pictures and statues are veiled from public sight; manual labor, though it is no longer entirely prohibited, is by many persons voluntarily suspended, the rigor of fasting is redoubled, and alms-deeds and other works of mercy sedulously enjoined and practiced. All church services of the week, moreover, breathe the spirit of mourning, some being devoted specially to the commemoration of

particular scenes in the Passion of the Lord Jesus. The days thus specially solemnized are Palm Sunday, Spy Wednesday, Holy (or Maundy) Thursday, Good Friday (q.v.), Holy Saturday. Holy Thursday (called also Maundy Thursday, from *Mandatum*, the first word in one of the church services of the day), in the Rom. Cath .Church is specially designed as a commemoration of the Last Supper, and of the institution of the Eucharist. But there are several other services annexed to the day, as the solemn consecration of the oil or chrism used in baptism, confirmation, orders, and extreme unction, the washing of pilgrims' feet and the tenebræ. To Holy Saturday belongs the solemn blessing of fire and of the water of the baptismal font; and from earliest times, it was set apart for the baptism of catechumens, and for the ordination of candidates for the ecclesiastical ministry. From the fire solemnly blessed on this day is lighted the Pascal Light, which is regarded as a symbol of Christ risen from the dead. This symbolical light is kept burning during the reading of the gospel at mass throughout the interval between Easter and Pentecost.

In the Prot. communions, the solemnization of Holy Week and of Good Friday (q.v.), has extended since the end of the 19th and the beginning of the 20th centuries, especially in large cities.

HOMAGE, n. *hŏm'āj* [F. *hommage*, homage, duty—from Prov. *homenatge*—from mid. L. *hominātĭcum*, feudal homage—from L. *homo*, a man]: in feudal times, the service or fealty promised by a knight or vassal to his lord or superior, as his lord's *man;* the act of giving the promise. The word is derived from the form of expression used in doing the service, which was—*jeo deveigne vostre home*—I become your man. Since the abolition of tenures, the word has no substantial legal meaning in the law of England, except in a limited sense as to copyholds, to denote the kind of acknowledgement made by a tenant to the lord of the manor. *Homagium reddere* was the expression, now obsolete, signifying a solemn renunciation of homage or fealty to the lord, and a defiance of him. The word denotes also in general, respect paid by outward action; reverential worship; devout affection; recognition of superiority.—Syn.: fealty court; submission; reverence; honor; respect; regard; deference; obeisance.

HOMALONOTUS, n. *hŏm'ă-lŏ-nō'tŭs* [Gr. *homălos*, on the same level; *nōtos*, the back]: in *geol.*, a genus of trilobites.

HOMALOPSIDÆ: family of colubrine serpents, of the group *Suspecta;* comprising several genera, of which some are N. American; characterized by flat spaces on the head and abdomen. They inhabit the rivers of southern Asia.

HOMALOPTERA, *hŏm-a-lŏp'tĕr-a* [Gr. *level-winged*]: name given by some entomologists to a small order of insects, more generally regarded as a division of the order

Diptera. The Homaloptera have been called also PUPIPARA, from the remarkable circumstance that the larvae are hatched within the body of the mother, and remain there till they have passed into the pupa state. Some of the Homaloptera are wingless. Examples of this order are found in the forest fly (q.v.), and in those extraordinary parasites of bats called *Nycteribia.* All the Homaloptera are parasites.

HOMBRE, n. *hŏm'bèr:* another spelling of OMBRE, which see.

HOME, n. *hōm* [AS. *ham;* Goth. *haims;* F. *hameau,* a village, a dwelling: Icel. *heimr,* an abode; *heima,* home]: a dwelling-house; an abode; one's own country: ADJ. domestic; produced at home or in one's own country; close or severe, as a home-thrust: AD. to one's own habitation or country; close to our own breast or affairs; to the utmost; fully; closely: *home* is used of anything close in its place—applied to the sheets of the sails, to the shot in a gun, etc. HOME'LY, a. *-lĭ,* plain; not handsome; not polished; easy and plain in manners: AD. in a homely manner. HOME'LINESS, n. *-nĕs,* want of beauty; plainness; want of polished manners. HOME'LESS, a. without a home. HOME'LESSNESS, n. state of being without a home. AT HOME, at one's own place of abode. AT HOME IN ANYTHING, conversant or familiar with. HOME-BORN, native; not foreign. HOME-BOUND, or HOMEWARD-BOUND, on the way to one's abode or native country, particularly by sea. HOME-BRED, native; plain; uncultivated. HOME-BREWED, brewed at home, as beer or ale. HOME FARM, the cultivated fields around a mansion-house and grounds—frequently kept in the proprietor's own hands. HOME-MADE, of domestic manufacture. HOME OFFICE, the department of government which has direct control over all matters relating to the internal affairs of Great Britain and Ireland. HOME SECRETARY, in *Britain,* one of the high officers of state to whom is intrusted the management of affairs connected with the civil jurisdiction of the kingdom. HOME'SICK, a. pining after one's native place or home. HOME'SICKNESS, n. HOME-SPUN, a. wrought at home; plain in manner or style; not elegant: N. a coarse, rude, untaught, person. HOMESTEAD, n. [*home,* and *stead*]: the ground on which a house stands, and the inclosed ground surrounding it. HOME'WARD, ad. in the direction of, or toward home. TO BRING A THING HOME, to prove guilty; to convict. TO COME HOME, to remember with sorrow; to recoil upon as a punishment; to convict. TO DRIVE A NAIL HOME, to advance a reason or argument which cannot be resisted. —SYN. of 'home': residence; house; dwelling; tenement; the seat; country;—of 'homespun': native; plain; coarse; rude; homely; inelegant.

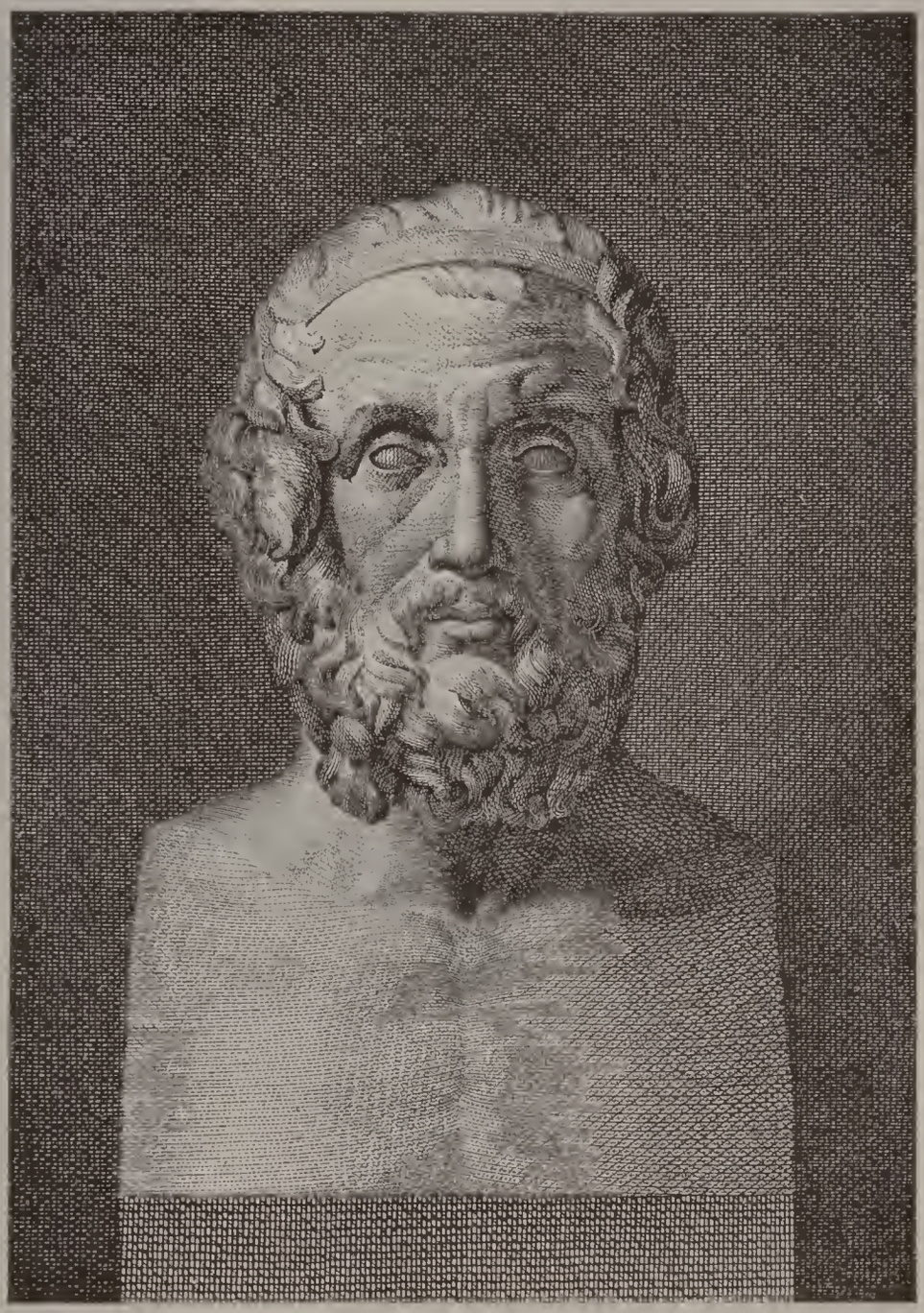
HOME, *hōm*, HENRY (Lord KAMES): 1696-1782, Dec. 27; b. Kames, Berwickshire: eminent Scottish lawyer and author. Intended by his friends for the law, he was apprenticed 1712 to a writer to the signet; but he afterward decided on adopting the highest branch of his profession, and qualified himself for it mainly by private reading and attendance at the courts. Entering the bar 1723, he was raised to the bench 1752, Feb., assuming the title of Lord Kames, and was made one of the lords of justiciary 1763. He is best known, however, by *Essays on the Principles of Morality and Natural Religion* (1751), containing a solution of the question of human freedom, which brought on him the suspicion of infidelity, and raised considerable controversy in the courts of the church and through the press; his *Introduction to the Art of Thinking* (1761); and above all, his celebrated *Principles of Criticism* (1762), the work on which his fame now chiefly rests. Though thus busily occupied with judicial and literary labors, he took active interest in agriculture and commerce. His last work, *Loose Thoughts on Education* (1781), was written in his 85th year. See Lord Woodhouselee's *Memoirs of the Life and Writings of Home* (2 vols. 4to, Edin. 1807; Lond. 1814).

HOME, JOHN: 1722-1808: Scotch clergyman and dramatist. He studied for the Presbyterian ministry, and was appointed to the parish of Athelstaneford, where he wrote his tragedy of *Douglas*, which was acted in Edinburgh, and received with the utmost enthusiasm. The production of this piece gave great offense to his clerical brethren, and he was finally compelled to retire from the ministry. He retired into England, where he obtained the protection of the Earl of Bute, received a pension, and wrote other dramatic pieces, all forgotten long since. It is difficult now to understand the enthusiasm with which *Douglas* was greeted. It was praised by men of all ranks, and Burns—who should have known better—talks of Home having

> 'Methodized wild Shakspeare into plan.'

This enthusiasm has departed long ago.

HOMELYN, *hōm'lĭn* (*Raia miraletus* or *maculata*): species of Ray (q.v.), common on the s. coast of England,



HOMER.

and plentiful in the London market. In form and appearance, it more nearly resembles the thornback than the skate. On some parts of the British coast, the Homelyn is called Ray. It is known also as the spotted Ray.

HOMER, n. *hō'mėr* [Heb. *hkomer*, a mound, a heap]: a Hebrew measure containing about 75 gallons 5 pints liquid measure, or 8 bush. dry measure; also CHOMER, n. *kō'mėr*, and COR. n. *kōr*.

HOMER, n. *hō'mėr:* a pigeon trained to fly home from distant places.

HOMER, *hō'mėr:* village in Homer tp., Cortland co., N. Y.: on the Syracuse, Binghamton and New York railroad; 3 m. n. of Cortland, 27 m. s. of Syracuse. It is in a fertile valley on the Tioghnioga river, has several churches, national banks, academy and graded school, and has large flour mills, blast furnace, and axe, tub, pail and wagon factories. Pop. (1910) 2,095.

HOMER, *hō'mėr:* greatest name in the history of epic poetry, as eminent in that department as the name of Shakespeare in the drama; in modern times unfortunately little better than a name, presenting materials for biography as scanty as the materials for criticism are rich. We are not, however, forced to go to such lengths of doubt in his case as Aristotle did in the case of Orpheus, denying that such a man ever existed; for though the Germans, since the days of Heyne, Wolf, and Niebuhr, have indulged themselves in every variety of historical skepticism, and reduced Homer, as well as Cadmus and Hercules, to mere 'symbols,' the more sober genius of British criticism, with which the moderate views of the best later Germans coincide, has pronounced an almost unanimous verdict in favor of the historical reality of the author of the *Iliad* and the *Odyssey*. Not that any reliance is to be placed on the details of the old Greek lives of Homer, which are manifestly fictitious; but the internal evidence of the poems themselves leads to the belief in an authorship such as agrees substantially with the kernel from which these very ancient legendary traditions were developed. The central fact in which all these traditions agree is, that the author of these poems was an Asiatic Greek; and though other places are named, the greatest amount of legendary evidence clearly points to Smyrna as the city which had the honor of giving birth to the father of epic poetry. The dialect in which the *Iliad* and *Odyssey* are written—the Ionic—is the very variety of Greek afterward used in the same region by Herodotus, the father of History, and by Hippocrates, first and greatest of Greek physicians; and the allusions to natural phenomena, especially the frequent mention of the strong n.w. wind blowing from Thrace, plainly indicate the w. coast of Asia Minor as the familiar residence of the poet. The chronology of the Homeric poems, both as respects the great central event which they celebrate—

the Trojan war—and the age of the poet himself, is much more doubtful; but it is quite certain that Homer lived considerably before the recognition of a regularly received record of dates among the Greeks—that is, before the year B.C. 776, the commencement of the calculations by Olympiads. The date given by Herodotus for the age of Homer—400 years before his own time, that is, about B.C. 850—is probable enough; but considering the entire lack of foundation for chronology in those early times, we must not seek an accuracy in this matter beyond that attained by the Greeks themselves; and we may allow a free margin of at least 200 years from the time of Solomon (B.C. 1000) downward, during which the singer of the *Iliad* and *Odyssey* may have lived. To throw him further back than the earliest of these dates would be inconsistent at once with the historical elements in the midst of which his poems move, and with the style of the language which he uses; for this exhibits a luxurious freedom, a rich polish, and an exquisite euphony, which removes it far from that roughness and clumsiness wont to characterize languages in their earliest stage of literary development. The Ionic dialect used by Homer is, in fact, a highly cultivated shoot of the old Hellenic stock, and which was in the poet's hands so perfect for the highest poetical purposes as to have remained the model for the epic style during the whole period of the poetical literature of the Greeks.

In endeavoring to form a correct estimate of the position of Homer as a poet, the primary fact from which we must start is, that he was not the epic poet of a literary age—like Virgil among the Romans, Tasso among the Italians, or Milton among Englishmen—but he was decidedly and characteristically an *aoidos*, or *minstrel*, a character well known from our mediæval literature, both in other shapes, and especially as presented by the kindred genius of Sir Walter Scott. That there is an essential and vital generic distinction between the popular minstrel of an age when books are either not known or little used, and the cultivated poet of an age which rejoices in all sorts of libraries, and possesses a special class of literary readers, admits no doubt. The conditions of the work to be done being different, the work itself cannot possibly be the same. It is quite certain, however, that the great majority of the English critics and translators of Homer have not recognized this distinction. The consequence is, that they strike an entirely false note, and blow the seraphic trump of Milton when they should be content to take a plain shepherd's pipe in their hands. These critics and translators are no doubt actuated by the noble desire of redeeming the author of two such noble poems as the *Iliad* and the *Odyssey* from the vulgar fellowship of wandering minstrels and ballad-mongers; but however high the genius of Homer unquestionably soared above the best of the mediæval ballads to which

the English ear is accustomed, it is quite certain both that the materials out of which his great poems were composed were nothing but such popular ballads and tales as delighted our forefathers before the invention of printing, and that the spirit and tone of the Homeric epos is distinguished from that of the literary epos or epos of culture precisely by those characteristics which distinguish our old ballads from the poetry of Wordsworth and Tennyson. Of modern poets, the one who possessed the greatest relationship to the genuine old minstrel poets was Sir Walter Scott; but even in his poetry many peculiarities can be pointed out which mark the literary writer of a later age, as distinguished from the popular singer of a people's boyhood and lusty youth. In order to understand Homer, therefore, we must look on him as the culmination of the minstrel or ballad poetry, in the shape of the minstrel epos; a grand combination of popular ballad materials and ballad tone, elevated to the highest pitch of which it is capable, with the architectural form and structure of the epos. To the recognition of this true character of the Homeric poems, the present age has been led mainly by the adventurous and suggestive criticism of the celebrated scholar, Frederick Augustus Wolf. This distinguished German, originally a professor in Halle, afterward in Berlin, published in 1795 the *prolegomena* to a new recension of the text of Homer, in which he maintained the extreme skeptical view already alluded to, according to which the *Iliad* is no proper epic poem in the sense that the *Æneid* and *Paradise Lost* are so, but only a skilful compilation of popular ballads, originally separate, and of whose separate existence the sharp-eyed critic can now easily adduce satisfactory proof. Now, this theory, commonly called, after its author, the Wolfian theory, and which has found, and still finds, not a few ingenious supporters in Germany, contains an important element of truth, which has too often been summarily rejected, with the error which it promulgates. It is not credible that poems pervaded by such a wonderful unity of tone and plan as the *Iliad*, manifestly inspired by a genius of the highest order, should be resolvable into the mere patchwork of skilful compilers; but it is an important truth to announce that the materials of Homer's poetry were not invented by himself, but taken up from the living traditions of the people to whom he belonged, and that even in the grand unity to which his genius has subjected them, their original popular tone and spirit is preserved in a fashion which characteristically distinguishes them from all epic poetry of the literary ages. This position, a golden mean between the extravagance of ultra-Wolfians and anti-Wolfians, was largely due to the scholarly work of Nitsch, Welcker, and K. O. Müller. Hermann carried Wolf's view further in some respects, and Lachmann boldly attempted to distinguish in the *Iliad* 16 independent 'lays.' Grote separated

the *Iliad* into an *Achilleid*, and books not about Achilles; Geddes holds the *Achilleid* as earlier, as European Greek, while the other books are by the same author as the *Odyssey*, namely, by Homer. Many scholars, both ancient (the *Chorizontes*) and modern, affirm the *Iliad* to be by one author, the *Odyssey* by another.

The characteristics of Homer's poetry, as the culmination of ballad poetry and the grand model of the minstrel epos, may be expressed in few words. In the first place, the materials are essentially national, and if not strictly historical in every detail of decoration, grow, like all ballad poetry, out of the real life of the people, and rest at least on an honest historical substratum. In this view, the *Iliad* is as valuable for the earliest history of the Helenic race, as Herodotus and Thucydides are for the later periods. But it is not for the Greeks alone that Homer possesses an important historical value; he is for all ages an important record of the earliest stages of human society, second only to the books of Moses, and perhaps some of the very oldest of the Vedas. The germs of almost all other arts and sciences afterward cultivated by the Greeks and Romans are found in Homer. In this view, he was to the Greeks themselves an encyclopedia of their national culture; and, as embodying the grand features of their polytheistic faith, he is also constantly quoted by their great ancient writers with all the deference due to a Bible.

The poems of Homer, as a great human inheritance, have naturally been incorporated, by translation, into all the languages of Europe. In Italian, the translations of Cesarotti and Monti—in French, that of Montbel—in German, that of Voss, are the most famous. In England, this great problem has been tried in the most various styles, and specimens of brilliant success in certain partial aspects have been produced. The whole excellence of Homer has not yet been exhibited in any one of the notable English translations, nor is such a combination perhaps possible. The grand flow, rapid march, and sonorous fulness of the original. are well given by Pope; the rough dramatic vigor of individual phrases and passages are best rendered by Chapman; while the unaffected truthfulness, and easy, unpretending grace, which so prominently mark the great antique minstrel, appear most clearly in Cowper. Of recent attempts to present Homer in some new aspect to English readers we may mention the translations of Newman (1856), Worsley (1861-5), Dean Alford (1861), Simcox (1865), Lord Derby (1865), John Stuart Blackie (1866), Herschel (1866), Merivale (1869), W. C. Bryant (1870-71), and Butcher and Lang (*Odyssey*, 1879).

For the various questions connected with Homer and the Homeric poems, consult the works on Greek literature by Colonel Mure and K. O. Müller; on Greek history by Grote, Curtius, and Cox; special works on Homer by Mr.

Gladstone, Prof. Geddes, and others; 'Homer' in Smith's *Dictionary*, and in the *Encyclopædia Britannica.*

HOMERIC, a. *hō-mĕr'ĭk:* pertaining to *Homer*, the great anc. poet of Greece, or to his age or poetry.

HOMESTEAD: borough, Allegheny co., Penn.; on the Monongahela river, and on the Pennsylvania and the Pittsburg and Lake Erie railroads, 8 m. s.e. of Pittsburg. Besides extensive manufactories of iron, glass, and fire-brick, it contains the largest steel-manufacturing plant in the United States, which in 1901 was absorbed by the United States Steel Corporation. Here in 1892, July 5-10, occurred one of the most serious labor troubles in the history of the country; 3,421 men struck against reduction of wages, non-union men were employed, and conflict and bloodshed followed, about 20 men being killed. The national guard of the state was called out to preserve peace. The strike was not ended until Nov. 20. Pop. (1900) 12,554.

HOMESTEAD ENTRY: generally used to designate the regulations of the United States land office for the disposal of public land to settlers: method of acquiring legal possession of a tract of surveyed public land, not exceeding one quarter section, for the purpose of creating a home. Upon proof of 5 years' residence, improvement and cultivation, the entryman may secure the title from the United States without payment other than the fees and commissions due local land officers.

Homestead entries may be perfected after 14 months' residence and cultivation upon payment of $1.25 per acre (or $2.50 per acre within limits of railroad grants), except entries made under particular laws which forbid commutation, or otherwise modify its provisions.

Irrigated public lands within projects of the U. S. Reclamation Service are open to homestead entry subject to the limitations of the Reclamation Act, approved 1902, June 17 (32 Stat., 388). Such entries are not subject to commutation, and will become subject to the charges per acre which may be determined upon as being the pro rata cost of the project, to be paid in not exceeding 10 annual installments.

The act of 1904, April 28 (33 Stat., 547), commonly known as Kinkaid Act, provides that homestead entries not exceeding 640 acres may be made within a designated area, approximately the western two-thirds of Nebraska. Provision is made for those who have made entry for 160 acres under the general provisions of the homestead law, to enter additional land. The commutation provisions of the homestead law do not apply, and at the time of making final proof the entryman must prove affirmatively that he has placed upon the land entered permanent improvements of the value of not less than $1.25 for each acre included in his entry.

All unappropriated surveyed public lands are subject

to homestead entry if they are not mineral or saline in character and are not occupied for the purposes of trade or business and have not been embraced within the limits of any withdrawal, reservation, or incorporated town or city; but homestead entries on lands within certain areas (such as lands in Alaska, ceded Indian lands, abandoned military reservations, reclamation projects, etc.) are subject to the requirements of the particular laws under which such lands were opened to entry.

A homestead entryman must be the head of a family or a person who has arrived at the age of 21 years, and a citizen of the United States, or in the actual process of becoming a citizen. Such person must not be the proprietor of more than 160 acres of land in any state or territory; and must not claim, nor have acquired title to, through settlement or entry made since 1890, Aug. 30, under any of the agricultural public land laws, any other lands which, with the lands last applied for, would aggregate more than 320 acres.

The making of one homestead entry exhausts the homestead right, but an additional entry of sufficient land to aggregate 160 acres may be made in accordance with special provisions of the homestead laws. Persons whose original entries failed through no fault of their own, prior to the passage of the act of 1904, April 28 (33 Stat., 527), may be permitted to make second homestead entries thereunder. Other acts of Congress have restored the privilege to settlers within a particular area, or where the former entry was commuted prior to 1900, June 5, or where the entryman paid the Indian price for lands to which he would have been entitled to receive a patent without payment under the Free Homes Act of 1900, May 17.

If a homestead settler dies before he makes entry, his widow has the exclusive right to enter the lands covered by his settlement, and if there be no widow, then his heirs or devisees may make the entry.

Contests may be instituted against entries for illegality or fraud in the inception of the entry, or for failure to comply with the law after entry, or for any sufficient cause affecting the legality or validity of the claim. Contestants will be allowed a preference right of entry for 30 days after notice of the cancellation of the contested entry. Should any person who has initiated a contest die before the final termination of the same, said contest shall not abate, but his heirs who are citizens of the United States may continue the prosecution of such contest and be entitled to the same rights that the contestant would have been if his death had not occurred.

Every soldier, seaman, marine and officer who served in the United States army, navy, or marine corps between 1861, April 15, and 1866, Aug. 20, or between 1898, April 21, and 1903, July 15, and was honorably discharged, is entitled to have the time served deducted from the five-

year period of residence required to perfect title under the homestead laws. If the soldier was discharged for disability incurred in line of duty, then the full term of his enlistment may be credited; but no patent can issue under the foregoing provisions to any settler who has not resided upon, improved and cultivated his homestead for a period of at least one year. Every such soldier, seaman, marine, or officer may, in person or by agent, file a declaratory statement for the land intended to be entered; but such claimant in person shall within six months thereafter make his actual entry, commence settlement and improvements, and thereafter fulfill all the requirements of law. Every soldier entitled to the benefits of the foregoing provisions, who entered less than 160 acres prior to 1874, June 22, may enter so much land as, when added to the quantity previously entered, shall not exceed 160 acres. The regulations of the land department provide for the assignment of this right, and neither residence nor cultivation of the land is required. In case of the death of a soldier who would be entitled to a homestead, or additional entry, under the foregoing provisions, his widow, or in case of her death or marriage without making entry, his minor orphan children, by a duly appointed guardian, shall be entitled to the foregoing benefits. If such person died during his term of enlistment, the whole term of his enlistment shall be deducted from the period required to perfect the title.

Persons desiring to make homestead entries should first fully inform themselves as to the character and quality of the lands they desire to enter, and should in no case apply to enter until they have visited and fully examined each legal subdivision for which they make application, as each applicant is required to swear that he is well acquainted with the character of the land described in his application, and as all entries are made subject to the rights of prior settlers.

Information as to whether a particular tract of land is subject to entry may be obtained from the register or receiver of the land district (of which there are 105 in the public land states and territories) in which the tract is located, but these officers must not be expected to furnish extended lists of lands subject to entry, except through township diagrams for which they are authorized to receive a fee of not less than $1 each. The total area and general character of the unentered land in the various counties of the public land states may be obtained by addressing the General Land Office, Washington, D. C. The United States General Land Office is a bureau under the Secretary of the Interior. The chief officers are the commissioner and the assistant commissioner. Land patents are prepared and, after being signed for the President by his secretary to sign land patents, are countersigned, sealed, and recorded by the recorder of the General Land Office.

HOMESTEAD ENTRY.

The total area of unappropriated public lands, 1907, June 30, exclusive of Alaska and insular possessions, is (surveyed) 230,961,159 acres, and (unsurveyed) 169,721,-481 acres. From the passage of the homestead act to 1906, June 30, 769,097 final homestead entries have been made, aggregating 103,441,550 acres.

Desert Land Entry—Used to designate an entry of public land under the act of 1877, March 3 (19 Stat., 377), as amended by the act of 1891, March 3 (26 Stat., 1095). The acts apply to North and South Dakota, Wyoming, Colorado, New Mexico, Arizona, and the states lying west of them. All lands exclusive of timber and mineral lands, which will not without artificial irrigation produce some agricultural crop, are deemed desert lands. A party desiring to make a desert land entry must file with the proper district land officers his affidavit that he is a citizen of the United States, or has declared his intention to become such, that he is a resident of the state or territory in which the land sought is located, and that he has not previously exercised the right of entry. The declaration must describe the land applied for, by legal subdivisions if surveyed, or, if unsurveyed, by giving with as much clearness and precision as possible, the locality of the tract with reference to known lines of survey or conspicuous landmarks, so as to admit of its being readily identified when the lines of survey come to be extended. The applicant must pay 25 cents per acre at time of entry, and submit satisfactory evidence of the desert character of the land, together with a map showing the mode of contemplated irrigation. Annual proofs must be made showing the expenditure of $1 per acre for the purpose of the statute for 3 years, and within the period of 4 years from entry the entryman must make final proof of the expenditure of at least $3 per acre, the actual irrigation of all the irrigable land included in the entry, the successful cultivation of at least one-eighth of the land entered, and of a clear right to the use of sufficient water to irrigate the whole of the irrigable land and keep it permanently irrigated. On proof of reclamation in accordance with the regulations of the land department, and payment of $1 per acre additional, a final certificate and receipt will be issued. Three hundred and twenty acres is the limit of entry under this act.

Within certain limitations, entries are assignable before patent, and provision is made that persons may associate together in the construction of canals and ditches for irrigating and reclaiming tracts entered. The aggregate sales of desert lands from the passage of the acts of 1906, June 30, have been 19,592 final desert land entries, aggregating 4,208,593 acres.

Timber and Stone Entry—The act of 1878, June 3 (20 Stat., 89), and the act of 1892, Aug. 4, sec. 2 (27 Stat., 348), provides for the sale of lands valuable chiefly for timber or stone and unfit for cultivation at the time of

sale. A person applying to purchase under the provisions of this act is required to make affidavit that he has made no prior application under this act; that he is a citizen of the United States, or has declared his intention to become a citizen. The affidavit must designate by legal subdivisions the tract which the applicant desires to purchase, setting forth its character; stating that the same is unfit for cultivation, and valuable chiefly for its timber or stone; that it is uninhabited; contains no mining or other improvements, except for ditch or canal purposes (if any exist) save such as were made by or belong to the applicant, nor, as deponent verily believes, any valuable deposit of gold, silver, cinnabar, copper, or coal; that deponent does not apply to purchase the same on speculation, but in good faith to appropriate it to his own exclusive use and benefit; and that he has not, directly nor indirectly, made any agreement or contract, in any way or manner, with any person or persons whomsoever, by which the title he may acquire from the Government shall inure in whole or in part to the benefit of any person except himself. On filing with the register and receiver of the proper land district the sworn statement required as above, accompanied by a filing fee of $10, a notice will be issued which the claimant is required to publish for 60 days and on the day named, or within 10 days thereafter, offer proof before the officer designated therein in accordance with the regulations of the land department.

With the proof the claimant must tender payment for the land at $2.50 per acre, and if no adverse claim or protest against accepting the proof is filed before final certificate has been issued, and the evidence is satisfactory to the register and receiver, they will issue their certificate and receipt.

In this class of entry, as also in that of homestead and desert entry, entryman must furnish affidavit showing that since 1890, Aug. 30, he has not perfected title to, nor is he claiming, under any of the agricultural land laws, an area of land which, added to that applied for, would exceed 320 acres.

Reclamation Law (32 Stat. L., p. 388), act of 1907, June 17, provides that all moneys received from the sale and disposal of public lands in Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Utah, Washington, and Wyoming, beginning with the fiscal year ending June 30, 1901, including the surplus of fees and commissions in excess of allowances to registers and receivers and excepting the five percentum of the proceeds of the sales of public lands in the above states set aside for educational and other purposes, shall be reserved, set aside and appropriated as a special fund in the treasury, to be known as the Reclamation Fund, to be used in the examination and survey for and the con-

struction and maintenance of irrigation works for the storage, diversion and development of the waters for the reclamation of the arid and semi-arid lands in the said states and territories.

Principal features of law are: (1) Public lands reclaimed subject to entry by any bona-fide citizen of United States, but entryman in addition to complying with provisions of homestead act must reclaim at least one-half of the total irrigable area of his entry for agricultural purposes before patent is issued by the Government. (2) No entry exceeding 160 acres can receive water from any government project. The area of farms under each project may vary from 10 to 160 acres, in the discretion of the Secretary of the Interior, the size of farm depending upon character of soil and products and the relation of the lands to the irrigation system. (3) Actual and continuous residence on the land is required in accordance with the homestead laws. The commutation clause in the homestead laws does not apply to these entries. (4) Settlers on these lands are required to take water from the government system and to pay in annual installments not exceeding 10 the proportionate amount charged against the land included in the entry. These charges are determined by the Secretary with a view of returning to the reclamation fund the estimated cost of construction of the project and are apportioned equitably. Failure to make two payments when due subjects the entry to cancellation, with forfeiture of all rights under the law as well as money paid thereon. Failure to comply in good faith with the provisions of the law concerning residence renders the entry subject to cancellation. (5) When the payments required by the law are made for the major portion of the lands irrigated the management and operation of the works is turned over to the landowners, to be maintained at their expense. (6) The right to the use of water acquired under this law shall be appurtenant to the land irrigated, and beneficial use shall be the basis, the measure and the limit of the right.

Since the passage of the law plans have been approved and construction is now going forward on 26 projects in the Reclamation States. By a special act of Congress Texas was admitted to enjoy the privileges of the act.

The law is unique in many essentials and differs widely from any previous land laws enacted by Congress. The Secretary of the Interior is given broad powers in carrying out the provisions of the law, and as a result of freedom from legislative interference rapid progress has been made in the actual work of construction. About $26,000,000 has been expended and a number of important irrigation works are now completed and in operation.

RECLAMATION PROJECTS NOW IN PROGRESS OF CONSTRUCTION OR COMPLETED.

Project.	Estimated cost.	Irrigable acreage.
Salt River, Arizona	$ 5,300,000	200,000
Yuma, California-Arizona	3,500,000	100,000
Uncompahgre, Colorado	5,200,000	150,000
Minidoka, Idaho	1,800,000	*80,000
Payette-Boise, Idaho	1,605,000	120,000
Garden City, Kansas	260,000	*8,000
Milk River, Montana	1,500,000	40,000
Huntley, Montana	900,000	*33,000
Sun River, Montana	500,000	16,000
North Platte, Nebraska-Wyoming	4,100,000	110,000
Truckee-Carson, Nevada	4,000,000	*200,000
Hondo, New Mexico	336,000	*10,000
Carlsbad, New Mexico	600,000	*20,000
Rio Grande, New Mexico	200,000	15,000
Lower Yellowstone, Montana-North Dakota	2,700,000	60,000
Buford-Trenton, Williston, Nesson, North Dakota (2)	1,270,000	40,000
Klamath, Oregon-California	2,400,000	50,000
Umatilla, Oregon	1,100,000	18,000
Belle Fourche, South Dakota	3,000,000	100,000
Strawberry Valley, Utah	1,850,000	35,000
Okanogan, Washington	500,000	9,000
Tieton, Washington	1,400,000	24,000
Sunnyside, Washington	2,000,000	40,000
Wapato, Washington	600,000	20,000
Shoshone, Wyoming	3,500,000	100,000
Totals	$50,121,000	1,598,000

* Completed.

HOMICIDE, n. *hŏm'ĭ-sīd* [F. *homicide*—from L. *homĭcīdĭăm*, homicide—from *homo*, a man; *cado*, I strike or kill]: in *law*, the killing of one human creature by another; also the person who kills—manslayer. In law the term denotes the mere killing of a human being without implying the attendant criminal responsibility. It is used with the word *justifiable*, to denote that the killing was done under lawful authority, as hanging a man, or killing a prisoner as a last resort to prevent his escaping, or killing one as a last resort to prevent his commission of an atrocious crime. *Excusable homicide* means killing in self-defense, or in defense of a wife, child, parent, or servant, or property, or by mere accident. The line between the justifiable and the excusable is not clearly drawn. *Felonious homicide* includes murder (q.v.) of one's self or of another; and *manslaughter* (q.v.) is killing without malice, but attended with negligence, hot blood, or in some unlawful way. In Scotland, excusable homicide is usually called culpable homicide. HOM'ICI'DAL, a. *-sī'dăl*, inclined to kill, murderous, bloody. HOMICIDAL MANIA, blind, irresistible tendency to destroy human life, developed under certain morbid conditions, independent of hatred or any appreciable incentive, and even in opposition to the general disposition and the interests of the perpetrator. The victim selected is often a child, a wife, a benefactor, or an object of love and respect. Hoffbauer, in Germany; Esquirol, Marc, Foville, in France;

and Conolly, in Britain, all have demonstrated, and in criminal courts have testified to, the existence of this form of mental disease. It is recognized, yet not definitely, as a bar to trial or to punishment. The impulse may be manifested in a more complicated form, originating in delusions; and the act which first reveals the mental condition may be in supposed self-defense, or to secure the salvation or prevent the suffering of the individual destroyed. Such manifestation may constitute the characteristic symptom of furious madness which sacrifices all around. There is in many natures an ill-defined satisfaction on hearing of atrocities. The puerperal condition, various hereditary tendencies, powerful moral impressions, and atmospherical influences, are conceived to induce this homicidal tendency. The proximate cause is usually found in marked organic changes in the nervous system, or in more insidious and obscure structural alterations, which are supposed to accompany perverted and depraved instincts.

Esquirol, *Des Maladies Mentales;* Marc, *De la Folie;* works by other French specialists: Tardieu, De Boismont, Despine, and the medical journals.

HOM'ILDON, Battle of: in the border warfare between England and Scotland, 1402. A Scottish army of about 10,000 men invaded England, under Sir Murdach Stewart of Kincleven, eldest son of the Regent Albany, and of Archibald, Earl of Douglas. They advanced to the gates of Newcastle without opposition, and were returning to Scotland laden with spoil, when they were encountered by an English force under the Earl of Northumberland, his son Hotspur, and the exiled Earl of March or Dunbar. The Scotch took up their position on Homildon Hill, near Wooler. Sep. 14, Hotspur was advancing to charge them, when he was stopped by the Earl of March, until the English archers should do their work. The work of the archers was deadly; and though the Scots, rallied by Sir John Swinton, charged bravely on their foes, the English had an easy victory, and the Scots were utterly routed. Their leaders were taken prisoners; five of their best knights, with many of their bravest esquires, were slain; and besides the numbers that were killed on the field by the English arrows, about 500 were drowned in attempting to cross the Tweed.

HOMILETICS, n. plu. *hŏm'ĭ-let'ĭks* [Gr. *homīlētĭkŏs,* social,—from *homīlĕō,* I converse, I have intercourse with]: that branch of theology which treats of sermons, or of the more familiar homily, and the best way of preparing and delivering them. The earliest writer on the subject of homiletics is St. Augustine, whose book, *De Doctrina Christiana,* is in some sense an adaptation of profane rhetoric to sacred uses. Rabanus Maurus and Isidore of Seville also incidentally treat the subject; but the nearest approach to a systematic treatment of the

subject in mediæval literature is in Hunibert, *De Eruditione Concionatorum.* St. Carlo Borromeo's *Instructiones Pastorum* was a part of his general scheme for the improvement of clerical education; and in the ecclesiastical course, as well of Rom. Catholics as of Protestants, homiletics have an important place. The bare enumeration of the works of Schott, Marheineke, Theremin, Sailer, Gisbert, Brand, Laberenz, may show the importance attached in both churches to this branch of sacred science. HOM'ILET'IC, a. *-ĭk,* or HOM'ILET'ICAL, a. *-ĭ-kăl,* pertaining to. HOM'ILY, n. *-lĭ* [mid. L. *homilĭă,* a homily]: plain, familiar sermon. HOM'ILIST, n. *-lĭst,* a preacher.

HOMILIA'RIUM: collection of homilies for the use of pastors; in use from a very early period. Mabillon mentions a very ancient Gallican homiliarium (*De Lit. Gallican*). The 50 homilies of Venerable Bede, too, were in familiar use among the clergy in all parts of the West, and we find in the letters of the early mediæval time, traces of a busy interchange of sermons, original or otherwise, between bishops and clergy, even in distant countries. The supply, however, was imperfect and scanty, and one of the many reformatory measures of Charlemagne was a compilation of homilies under the title of homiliarium, made in the end of the 8th c. under his direction by the deacon Paul Warnefried, and containing homilies for all the Sundays and festivals of the year. Many synods of that and subsequent periods directed the clergy to translate these sermons for their flocks, and the collection continued in use for this purpose till the 16th c. It was printed at Speyer 1482, again at Cologne 1557. A collection of homilies is ascribed also to Alcuin, but it seems more likely to have been but a modification of the homiliarium of Warnefried. A collection of English homilies turned into verse, that they might be more readily remembered by the people, appears to have been composed about the middle of the 13th c.: this collection, affording a metrical sermon for every Sunday and festival day in the year, exists in MS.; and a portion of it has been edited by the librarian to the Univ. of Edinburgh.

HOMILY: primitively signifies discourse held with one or more individuals, but in ecclesiastical use it means a discourse held in the church, and addressed by the minister to the congregation. The practice of explaining in popular form the lessons of Scripture read in the synagogues, had prevailed among the Jews, and appears to have been adopted in the Christian churches from earliest times. The discourses employed for this purpose were of the most simple character; but with the exception of one ascribed to Hippolytus (q.v.), we have no sample of this form of composition earlier than the homilies of Origen, 3d c. Taking these as a type, the early Christian homily may be described as a popular exposition of a portion of

Scripture, accompanied by moral reflections and exhortations. It differs from the sermon [Gr. *logos*, Lat. *oratio*] in eschewing all oratorical display, and in following the order of the scriptural text or narrative, instead of being thrown into the form of a rhetorical discourse or a didactic essay. The schools of Alexandria and Antioch appear to have been the great centres of this class of sacred literature, and in the early centuries we find the names of Hippolytus, Metrodorus, Clement of Alexandria, Dionysius, and Gregory Thaumaturgus, as principally distinguished. But it was in the following centuries that the homily received its full development in the hands of the Oriental Fathers, Athanasius, the two Gregories, of Nyssa and of Nazianzum, Basil, the two Cyrils, of Jerusalem and of Alexandria, and above all, Chrysostom; and in the West, of Ambrose, Augustine, Peter Chrysologus, Leo, and Gregory the Great. In later centuries, Venerable Bede, the popes Sabinian, Leo II. and III., Adrian I., and the Spanish bishops, Isidore of Seville and Ildefonsus, continued to use the homiletic form; and even in the modern church, many preachers have regarded it as the best medium of scriptural instruction; and two different forms of homily are distinguished, the higher and the lower. The former follows the order of matter, rather than of any scriptural passages assumed to be expounded; the latter is a purely exegetical and moral exposition of some lesson from the liturgy, or of some other extract from Holy Scripture.—This strictly historical acceptation of the name homily is not uniformly observed in modern use. The name homily is very frequently used, almost as a synonym for sermon, and signifies nothing more than a plain, moral discourse, without ornament or rhetorical pretension, but equally without any pretension of being molded on the ancient patristical model.

HOMILIES OF THE CHURCH OF ENGLAND: collection of sermons, the first part of which was published 1547, the first year of the reign of Edward VI., to be read in the churches, partly to supply the defect of sermons, but partly, also, to secure uniformity of doctrine, and to guard against the heterodoxies, old and new, which at that time threatened the unconsolidated church. The second part was published 1562, in the reign of Elizabeth, at the same time with the articles. The 35th article declares that 'the Book of Homilies doth contain a godly and wholesome doctrine, and necessary for these times:' the 21 titles are enumerated in the article. The homilies are not now read in churches; but there is no law to prevent their being so read, and they are frequently appealed to in controversies as to the doctrine of the Anglican Church on the points of which they treat. Their precise degree of authority is matter of doubt.

HOMING, n. *hōm'ĭng* [see HOME]: a name applied to the faculty possessed by carrier-pigeons of finding their way *home* after being carried away many miles.

The training of a homing-pigeon begins when it is about three months old. It may then be taken to a distance of about a mile from its loft in a suitable direction and liberated in order that it may fly back. After an interval of a day or two it should be carried three miles from home in the same direction and set free, and on the third occasion, a few days later still, the distance is usually increased to six miles. This mode of training is continued steadily during the season, the successive distances above those already mentioned being 12, 25, 50, 75, 96, 125, 155, and 200 miles. The intervals of rest must be carefully preserved, especially in unfavorable weather. During the bird's second season it is made to repeat something of its first year's performances and to extend its flight.

HOMINIDÆ, *hō-mĭn'ĭ-dē* [Lat. *homo,* man—meaning man-family]: term proposed by some naturalists to designate man as a family in the same order with the QUADRUMANA—thus placing man with apes and monkeys in a new order, PRIMATES. This proposal has not found general favor among naturalists. Some of them instead classify man by himself in the order BIMANA, maintaining with Prof. Owen, that 'man is the sole species of his genus, the sole representative of his order.' Under the order BIMANA, men are grouped in varieties and races, but not into genera. Others reject altogether such classification of man with brutes. See BIMANA; MAN.

HOMINY, n. *hŏm'ĭn-ĭ* [Indian word *auhūmĭnĕă,* parched corn]: Indian-corn meal, a bread-stuff of N. America; a dough-cake made from it.

HOMO, *hō'mō,* sometimes *hŏm'ō* [Gr. *homos,* similar or same]: a common prefix, meaning 'same, similar, or alike.'

HOMOCARPOUS, a. *hō'mō-kär'pŭs* [Gr. *homos,* alike; *karpos,* fruit]: having all the fruits of a flower-head alike.

HOMOCENTRIC, a. *hō'mō-sĕn'trĭk* [Gr. *homos,* similar; *kentron,* the centre]: having the same centre; concentric.

HOMOCERCAL, a. *hō'mō-sĕr'kăl* [Gr. *homos,* alike; *kerkos,* the tail]: having equally bilobate tails, as the herring and the cod: see HETEROCERCAL.

HOMOCHROMOUS, a. *hō'mō-krō'mŭs* [Gr. *homos,* alike; *chrōmă,* color]: applied to flowers when all the florets in the same flower-head are of the same color.

HOMODROMOUS, a. *hō-mŏd'rŏ-mŭs* [Gr. *homos,* alike; *dromos,* a course]: in *bot.,* running in the same direction, as spirals, or leaves on the stem and branches.

HOMŒOMERIC, a. *hō'mē-ō-mĕr'ĭk* [Gr. *homoios,* similar; *meros,* a part]: having sameness of parts.

HOMŒOPATHY, n. *hō'mē-ŏp'ă-thĭ* [Gr. *homoios,* similar, like; *pathos,* suffering]: a mode of treating diseases by the administration of medicines which are found cap-

able of exciting in healthy persons symptoms closely similar to those of the disease of the patient under treatment. HO'MŒOPATH'IC, a. *-ō-păth'ĭk*, or HO'MŒOPATH'ICAL, a. *-ĭ-kăl*, pertaining to homœopathy. HO'MŒOPATH'ICALLY, ad. *-lĭ*. HO'MŒOP'ATHIST, n. *-ŏp'ă-thĭst*, one who believes in and practices homœopathy. *Note.*—The *o* in *œ* is often dropped in the spelling.

HOMŒOPATHY, *hō'mē-ŏp'a-thĭ:* a system of medicine introduced into practice about the close of last century, by a German physician named Hahnemann (q.v.). It is founded on the belief, that medicines have the power of curing morbid conditions similar to those conditions which they have the power to excite; expressed in Latin by the phrase, *Similia similibus curantur,* and in English by 'like cures like.' That diseases are cured by substances which produce in persons in health symptoms like those presented by a patient, has been from the earliest times a recognized fact, both by medical writers and by poets who have expressed the prevailing belief of the ages in which they lived. Among the former, we find the author of a treatise generally ascribed to Hippocrates, entitled *On the Places in Man.* This writer gives numerous examples of what may be called *homœopathic* cures; and recommends for the cure of mania this remarkable prescription: 'Give the patient a draught made from the root of mandrake, *in a smaller dose than sufficient to induce mania.*' The works of the poets abound with illustrations of this belief. Probably the oldest expression of it is in some lines ascribed by Athenæus to Antiphanes (B.C. 404), thus translated—

> 'Take the hair, it is well written,
> Of the dog by which you're bitten;
> Work off one wine by his brother,
> And one labor with another;

Shakespeare, in *Romeo and Juliet,* expresses the same maxim:

> 'Tut, man! one fire burns out another's burning;
> One pain is lessened by another's anguish.
> * * * * *
> Take thou some new infection to the eye,
> And the rank poison of the old will die.'

Milton, in the preface to *Samson Agonistes,* gives his version thus: 'In physic, things of melancholic hue and quality are used against melancholy, sour against sour, salt to remove salt humors,' etc. Thus, there has always been a vague tradition that medicines sometimes cured diseases similar to those they caused. But it was reserved for Hahnemann to propound the startling dogma, not only that medicines did occasionally produce such cures, but that true, direct, and radical cures could be effected only by recognizing this principle as the guide for the selection of the right remedy in any given morbid condition of the system. He engaged his friends and disciples in the task of procuring accurate data on which to proceed in reducing his rule to practice. They took given quantities of the substance which was the subject of experiment, and

each kept a record of the effects that it produced. The various records thus obtained were submitted to Hahnemann, who compared them together and with his own observations on himself, and out of the results thus obtained, compiled what is named 'a proving' of the medicine. Hahnemann lays it down as one of the fundamental propositions of homœopathy, that no medicine should be given to the sick which has not first been *proved* upon those in health. He devoted himself to this task, and has left ten volumes of such 'provings;' out of this work the various abridgments in popular use in this and other countries have been derived. The properties once determined, then it becomes possible to administer it in accordance with the principle of homœopathy. To do so, however, it is requisite that the medicine should be given by itself. Thus, the second proposition of Hahneman's system is, 'that only one medicine should ever be given at once.'

To ascertain the effects of medicinal substances on persons in health—from the knowledge thus obtained to select a remedy whose action corresponds with the symptoms of the patient under treatment—to give this remedy by itself alone, are three of the fundamental rules for the practice of homœopathy. The fourth is, that the dose of a homœopathic medicine should be so small as not to cause any general disturbance of the system, its action being limited to that portion of the body which is in a morbid condition. How small that is, can be ascertained only by experiment. Hahnemann pointed out that the amount of the effect of a medicinal substance depends upon two conditions: *first*, the mechanical form inwhich it is administered; and *second*, the state of the body of the person who takes it.

For example, a hard pill of belladonna of five grains, swallowed by a robust and healthy man, may be followed by only trifling symptoms; but let that pill be dissolved in a pound of water, and an ounce of the solution be given every hour, then will ensue well-marked symptoms of the poisonous action of the drug. But if, instead of administering it to a person in health, it be given to one who is suffering from such an inflammation of the tonsils as belladonna produces, then it will be found that the inflamed tonsils will be most acted upon by their specific irritant. Disease implies a preternatural sensitiveness. An inflamed eye cannot bear light, an inflamed stomach cannot bear food, and every diseased organ is powerfully affected by the particular substance which has, in its physiological operation, a close affinity with the character of the morbid condition in which it is at the time when its specific medicine is administered.

To arrive at the degree to which it was desirable to reduce the dose, a series of experiments were necessary. It was a matter to which all *a-priori* reasoning was inapplicable. In an article published in *Hufeland's Journal*, 1801, Hahnemann observes: 'You ask me what effect $\frac{1}{100000}$ of a grain of belladonna can have. The word *can* is apt to lead to misconceptions. Let us ask Nature what effect $\frac{1}{100000}$ of a grain of belladonna *has*.' He then states the

conditions of the experiment—viz., that this fraction of a grain should be administered to a patient suffering from a peculiar form of scarlet fever then prevalent in Germany, and presenting a combination of symptoms bearing a close resemblance to those produced by belladonna. Hahnemann maintained that this fraction of a grain was sufficient for the purposes of homœopathic cure.

Homœopathic doses are often expressed by fractions, thus: Suppose the medicine to be a vegetable substance; a strong tincture is made of it, technically called the *mother tincture.* Two scales of dilution are prepared from this called respectively the *decimal* and the *centesimal:* the latter was advocated by Hahnemann· the former, though of recent introduction, is now largely employed. To prepare the *decimal* attenuations, 1 drop of mother tincture is added to 9 drops of alcohol, and it is labelled $1^{\times}$. The *second decimal dilution* ($2^{\times}$) is formed by adding 9 drops of spirit to 1 drop of $1^{\times}$, and so on for the $3^{\times}$, etc. In preparing the *centesimals*, one drop of mother tincture is added to 99 drops of alcohol, so as to dilute it 99 times, and this preparation is called *the first dilution*, and marked 1. Again, a drop of number 1—that is, of the $\frac{1}{100}$ of a drop of the mother tincture—is mixed with other 99 drops of alcohol, and marked 2, or the second dilution. This contains $\frac{1}{100}$ of a drop of $\frac{1}{100}$ of a drop of the mother tincture, or $\frac{1}{10000}$ of a drop of the mother tincture. This simple process of subdivision is continued, and each step is recorded in the same way: thus, number 3 means a millionth; number 6, a billionth; and number 30 (the highest recommended by Hahnemann), a decillionth. Insoluble substances, of course, cannot be thus treated; they are triturated with sugar of milk. One grain, say, of sulphur is triturated with 99 grains of sugar of milk, forming *the first trituration*, and marked number 1, and so on; but after advancing to the fifth or sixth, then it is presumed that all substances become soluble in this very minute proportion in alcohol, and alcoholic dilutions are made of them in the same way as of the vegetable tinctures. After making these alcoholic preparations, the homœopathic chemist saturates with them minute pellicles of sugar of milk, known technically by the name *globules* or *pilules.* It must, however, be borne in mind that small doses are not necessarily homœopathy, which consists in the administration of drugs according to the law of *similars*, the *dose* being a matter in which experience has guided to dilutions in many, though not in all cases.

It is claimed that in the homœopathic system of practice, the selection of the medicine is made according to a simple rule based on a law of nature, while in all other systems there is necessarily more or less empiricism and uncertainty. This natural law is, that the introduction of any poisonous drug into the animal organism gives rise to two series of effects which are opposite in character. Thus, *Aconitum* produces chilliness, tingling, numbness, weakness, and fever, but followed by heat, flushings, and general physical and mental excitement. *Belladonna* causes congestion

of the face and brain, delirium, dilated pupils, dry throat, full, bounding pulse, rise of bodily temperature; but followed by contraction of the capillaries, contracted pupils, moist throat, small pulse, and lowering temperature. *Nux vomica* causes stimulation of the motor nerves, shown by increased reflex irritability and spasmodic movements; but followed by diminished irritability and paresis. *Opium* causes insensibility, immobility, slow respiration, contracted pupils, and constipation; but followed by irritability, insomnia, quickened respiration, slightly dilated pupils, and relaxation of the bowels.

This alternation of conditions under the action of poisons is a law of the vital economy which does not depend on any peculiarities of the individual drugs. The primary or yielding symptoms are of short duration, and are more marked when the dose is large: the secondary or reactionary symptoms are of longer duration, and are more marked when the dose is small and often repeated. In the homœopathic treatment of disease, it is desired to bring into prominence the teasing action of the drug which excites the resisting powers of the living organism. For this reason the best results are obtained when the dose is just large enough to arouse the antagonism of nature, without developing in any marked degree the so-called primary or poisonous action of the drug.

Theoretically, there are four possible rules for the selection of drugs for the cure of the sick. The poisonous effects of the selected drug must be related to the symptoms of the patient in one of the following ways: 1st. exactly opposite—antipathic; 2d, approaching opposite—allopathic; 3d, the same—isopathic; 4th, similar—homœopathic. Strictly antipathic practice is practically out of the question, because of the limitations of the materia medica. Strictly isopathic practice is likewise impracticable except in cases of poisoning, and its efficiency is questionable.

The 'allopathic' method is the practical application of the antipathic theory. It consists in the choice of a drug which will produce in the healthy symptoms different from those of the patient; the aim being to oppose the disease symptoms by the primary or overpowering action of the drug. Although this is the more obvious practice and though in some acute disorders it is satisfactory and safe, it is open to serious objections. 1st, So much depends on the intelligence, skill, and judgment of the physician as to what symptoms or conditions are the true opposites of those presented by the patient. Thus it is very difficult to prescribe antipathically for neuralgia, rheumatism, catarrh, croup, and other common ailments. Again, the cures by drugs given in large doses are often only temporary. Constipation may be treated by cathartic drugs, but it is a well recognized fact that the artificial diarrhea is followed by constipation, and the patient is generally worse in the end, because the secondary action of the medicine tends to confirm the previous habit. On the other hand there is comparatively little risk of an error of judgment in the selection of a remedy homœo-

pathic to neuralgia, rheumatism, catarrh, croup, or constipation. Besides, owing to the necessary reduction of the dose, the curative action of the drug will not be followed by a reaction in the opposite direction.

The 'provings' of drugs, instituted by Hahnemann, have been continued to the present day with the addition of certain safeguards against error, prominent among which are the requirement that the trustworthiness of the prover should be tested before or during the experiment by the introduction of 'blanks' or inert substances; that the prover should, if possible, be ignorant of the effects expected from the drug; that the thermometer and other instruments of precision, as well as the modern improved means of diagnosis, be made use of when applicable. A considerable portion of the materia medica is derived from accidental poisonings, and from the incidental effects of large doses given in the treatment of chronic diseases, but these latter sources are to be received with great circumspection, since they lack some of the elements of certainty which belong to pure experiment. The practice of homœopathy must be based on a 'pure' materia medica, i.e., a materia medica which includes nothing but the effects of drugs on healthy persons. These effects must be minutely described and placed in proper chronological order, mention being made of the conditions of aggravation or amelioration of the drug effects. 'Cured' symptoms or disease-conditions can form no part of the homœopathic materia medica. They are excluded because of their general untrustworthiness, and because, when truthful, they may represent the reactionary effects of the drug, which could not form the basis for homœopathic selection. Some of the more important text-books on pure materia medica are Hahnemann's *Materia Medica Pura*, Hahnemann's *Chronic Diseases*, Allen's *Cyclopædia of Materia Medica*, Hughes' and Dake's *Cyclopædia of Drug Pathogensy*, Hempel and Arndt's *Materia Medica*, Hale's *New Remedies*. There are also many condensed compilations for reference by the practitioner.

A system so revolutionary naturally encountered determined opposition. In Germany, there were legal obstacles to its practice. In Austria, physicians were not allowed to dispense their own medicines, even gratuitously; all medicines administered to the sick were prepared by the apothecaries, and the fate of homœopathy could not be trusted to their hands, as their interests were deeply involved. Thus it happened that, from 1818 to 1836, homœopathy was only tolerated in Austria under exceptional circumstances. In 1836, cholera broke out for the second time in Vienna, and Dr. Fleischmann, physician to an institution in which homœopathy has been followed, was required by government to prepare the hospital for the reception of cholera patients. He undertook the charge, on the condition that he was to be allowed to employ homœopathy in their treatment. This was granted, homœopathy having been very successful in Vienna and different towns in Germany in cholera 1830–31. He treated 732

cases; of these, 488 recovered, and 244 died. The hospital was under daily inspection by the government, and the result of the treatment was made known to Count Kolourat, the home minister. Shortly afterward the emperor issued an ordinance granting to every duly qualified physician the right to practice homœopathy. The cholera mortality under homœopathic treatment was in this instance one in three, while the average mortality of the same epidemic at the same place was two in three.

When cholera was approaching w. Europe, Hahnemann was studying his 'provings,' to ascertain what substance resembled most nearly in its effect the symptoms of the disease. The medicine he found to be camphor; and before he had ever seen a case of cholera, guided by the details given by practitioners, he announced in 1831: 'Every one, the instant any of his friends is taken ill of cholera, must immediately give him camphor.' This bold prediction, that camphor was the antidote for the first stage of cholera, was soon tested in Hungary and Moravia, and camphor has since been accepted universally by homœopathists as the most efficient remedy against an invasion of cholera.

The reported success of the homœopathic treatment of cholera at Vienna had a powerful influence in directing public attention to the hospital where the new system was practiced. Physicians from all parts of Europe and from America went thither to watch the treatment. In a report published by Dr. Fleischmann several years ago, it is stated that at that time he had treated 17,313 cases, chiefly of acute diseases. Among these were—of erysipelas, 514 cases, of which 510 recovered; of rheumatic fever, 1,417, of which 1,416 recovered; of intermittent fever, 1,066, of which 1,058 recovered; of inflammation of the lungs, 1,052, of which 1,004 recovered.

From Germany as a centre, where it is now extensively practiced and taught, homœopathy spread over Europe and America. It was introduced into England in 1827 by Dr. Quin, physician to the king of the Belgians; and there are now more than 300 registered practitioners in Britain who have adopted it. In London there is a hospital capable of containing more than 100 patients, where lectures are occasionally delivered by appointed teachers.

The American Institute of Homœopathy, organized 1844, is a large and energetic scientific body, devoted 'to the improvement of homœopathic therapeutics and all other departments of medical science.' There are two other national societies in the United States having similar objects; also 30 state and numerous local societies and clubs. There are 28 general and 33 special hospitals, 43 dispensaries, 23 medical journals, 16 medical colleges, and about 8,000 physicians, who practice in whole or in part after this method.

The patrons of homœopathic practice are among the intelligent and cultivated classes, hence any statistics derived from private practice would be likely to be favorable to this practice.

HOMŒOPATHY.

It is claimed that the records of hospitals, prisons, and almshouses, where the two prevailing systems have been tried side by side under conditions as nearly equal as it is possible to make them, show a decided advantage in favor of homœopathic practice, both as regards the time of sickness and the rate of mortality. It is claimed also that the statistics of yellow fever in the southern states are strongly in favor of homœopathic practice. On the other side, however, credit is not given to these statistics.

The number of physicians who *avowedly* practice homœopathy has not greatly increased of late; but its adherents claim that the *actual* practice of it has been greatly augmented. In proof of this they point to the more recent text-books in medicine, published by the teachers of the dominant school; and to the recognition of the value of small doses of aconite in inflammatory fevers, arsenic in gastritis, ipecacuanha (in one-drop doses) in vomiting, etc.

The objections entertained by physicians generally to the so-called 'homœopathic' practice of medicine are based, not on any unwillingness to employ medicines whose action resembles more or less the features of the disease for which they are prescribed, but solely on the impossibility, according to the common view, of adopting this as a specific rule of practice, and especially as an exclusive and all-embracing law of therapeutics. The action of emetics in some kinds of indigestion, and of rhubarb in some kinds of diarrhœa, are familiar examples in daily use, showing that ordinary practice is not regulated by any blind prejudice against what is called the homœopathic law of '*similia similibus curantur;*' but in these cases the physician does not in the least commit himself either in favor of or against the law, but rather sets it aside as a metaphysical abstraction, having nothing to do with the real principle of the cure, which, he claims, is to be found in common sense and experience, applied to the facts of individual cases and groups of cases. Physicians disavowing homœopathy especially disown as a nickname the title *allopathist*, invented for them by Hahnemann. It is stated that Hahnemann's alleged 'provings' have been rejected as in great part visionary by the great majority of those who have attempted to ascertain personally the effect of the same remedies; and to Hahnemann himself is ascribed the admission of the general aggravation of diseases by homœopathic doses when administered in sensible quantities, and the admission that the system of infinitesimal doses was with him simply a last refuge from the contradictory character of the results obtained under the earlier trials of remedies devised according to his assumed principle. The argument of physicians in general has been that the principle was false, and that the infinitesimal doses are its *reductio ad absurdum*. They admit freely that homœopathy has in some instances done good, by illustrating the spontaneous cure of disease, and correcting a blind faith in heroic remedies, but though individual converts of much local credit have here and there been made there is no movement in the profession toward adopting homœopathy as a system.

HOMŒOZOIC, a. *hō'mē-ō-zō'ĭk*, or HOMOIOZOIC, a. *-hō'-moy-ō-zō'ĭk* [Gr. *homoios*, similar; *zōē*, life]: applied to zones or latitudes, both of sea and land, which are characterized by the same forms of life.

HOMOGAMOUS, a. *hō-mŏg'ă-mŭs* [Gr. *homŏgămos*, married together—from *homos*, the same, similar; *gamos*, marriage]: in *bot.*, applied to composite plants having the flowers of the capitula all hermaphrodite. HOMOGAMIA, n. *hō'mō-gā'mĭ-ă*, or HOMOGAMY, n. *hō-mŏg'ă-mĭ*, in *bot.*, applied to the condition of plants when both parts of a generation are formed in a hermaphrodite flower exactly at the same period.

HOMOGANGLIATE, a. *hō'mō-găng'glĭ-at* [Gr. *homos*, like; *gangglion*, a knot, a little tumor]: in *zool.*, having a nervous system in which the ganglia are symmetrically arranged. HOMOGANGLIATA, name given by Owen to the *Articulata* of Cuvier, in accordance with a belief in the great importance of the nervous system as a basis of zoological classification. Each segment in the lowest H. contains a pair of ganglia with nerves proceeding from them; all, however, communicating by nervous filaments, and constituting a continuous chain. In the higher forms, there is greater concentration, and more evident allotment of the ganglia of particular segments to particular functions.

HOMOGENEOUS, a. *hō'mō-jē'nē-ŭs* [Gr. *homos*, same, like; *gĕnŏs*, kind]: of the same kind or nature; consisting of similar constituent elements; having a uniform structure or substance—opposed to *heterogeneous*. HO'MOGE'NEOUSNESS, n. *-nĕs*, or HO'MOGENE'ITY, n. *-jē-nē'ĭ-tĭ*, sameness of kind or nature; uniformity of structure or material.

HOMOGRAPH, n. *hŏm'o-grăf* [Gr. *homos*, same; *graphō*, I write]: in *milit.*, system of telegraphic signals by means of a white pocket-handkerchief; in *philol.*, a word which has exactly the same form as another, but is of different origin and meaning, as *fair*, the noun, a market; *fair*, the adjective, handsome. HOMOGRAPH'IC, a. *-ĭk*, in *geom.*, term applied to two figures so related that to any point in one only one point in the other corresponds, and *vice versa;* while to points situated in a line in either correspond collinear points in the other; also to rows of points, peneils of light, etc.; in *orthog.*, employing the same character always to represent the same sound. HOMOGRAPHY, n. *hŏm-ŏg'ra-fĭ*, in *orthog.*, the representation of each distinct sound by a distinctive character employed for that sound only.

HOMOIOPTOTON, n. *hŏm-oy-ŏp'to-tŏn* [Gr. *homoioptōtos*—from *homoios*, like; *ptōtos*, falling]: in *rhet.*, figure of speech in which the several parts of a sentence end with the same case or a term of like sound.

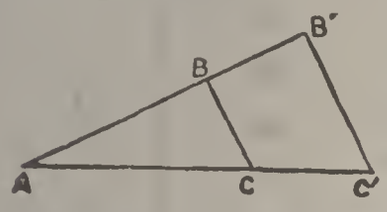
HOMOIOUSIAN, n. *hō'mŏy-ō'zĭ-ăn* [Gr. *homoiou'sĭŏs*, of like or similar substanee—from *homoi'os*, like; *ousĭă*, substance, being]: in *eccles. hist.*, one who held that the Son was of *like* essence with the Father, and not of the *same* essence: ADJ. pertaining to. HOMOOUSIAN, n. *hō'mō-ō'zĭ-ăn* [Gr. *homŏou'sĭŏs*, being of the same essenec or substance—

from *homos*, the same; *ou'sĭă*, essence, being]: one who maintained that the Son had the same essence with the Father. These two terms long distracted the primitive church. The first was the shibboleth of orthodoxy in the Arian controversy, according to the decree of the council of Nice, which declared the Son to be *homoousian*, of the same substance with the Father. The rigid Arians, who resisted the decree of Nice, rejected the term. The semi-Arians, who held the subordination of the Son to the Father, were divided as to its use. Some of them rejected the word altogether, as directly conveying a false idea; others, not absolutely rejecting the idea, regarded the word as objectionable, but rather as liable to misinterpretation, than as absolutely false. Both parties argued against its use from a decree of the council at Antioch 269, against Paul of Samosata, in which the name homoousian, as applied to the Son, was expressly condemned. They contended, therefore, that the Fathers of Nice had erred in applying it, and they proposed to substitute for it the term *Homoiousian* (of a like, i.e., a similar but not identical substance with the Father). The term, as used by the council of Antioch, bore a very different signification from that which the Fathers of Nice attached to it. In the controversy with Paul of Samosata who, with the Sabellians, held that the Father and the Son have but one and the same person, the word *ousia* was employed to signify personality. Hence, when the council condemned the doctrine of Paul, that the Son is homoousian with the Father, it merely declared that the Father and the Son are not one and the same person. On the contrary, the council of Nice, in defining that the Father and Son are homoousian, understand *ousia* in the very different signification of substance or nature. See the historical treatises of Athanasius, Newman's translation.

HOMOLOGATE, v. *hō-mŏl'ō-gāt* [Gr. *homŏlŏgos*, using the same words, of the same opinion—from *homos*, like; *logos*, a word]: to approve; to allow. HOMOL'OGATING, imp. HOMOL'OGATED, pp. HOMOLOGATION, Scotch law term, denoting an act or conduct which confirms or approves of something which otherwise might be invalid. The term is not used in English law, but similar effects are produced, and bear other names, such as confirmation, estoppel, part performance.

HOMOLOGOUMENA, n. *hŏm-o-lo-gô'mĕn-a* [Gr. *homologoumena*, things granted; *homologeō*, I speak the same language, I agree with]: in *scrip. canon*, term used by Eusebius of Nicomedia regarding those books of the New Testament the evidence for the genuineness and authenticity of which was deemed so strong that they were accepted at once, or at least without lengthened inquiry. The books thus designated were the four gospels, the Acts of the Apostles, thirteen of the Epistles of St. Paul (that to the Hebrews not being one), I John and I Peter.

HOMOLOGOUS, a. *hō-mŏl'ō-gŭs* [Gr. *homŏlŏgŏs*, assenting, agreeing—from *homos*, the same, like; *logos*, speech]: having the same ratio or proportion; constructed on the same plan, though differing in form and function. *Homologous quantities* or magnitudes in geometry are such as correspond, or are like to one another. For example, in similar triangles, the homologous sides are those which are opposite to corresponding angles. In the triangles ABC, AB′C′, which are similar, BC is homologous to B′C′, AB to AB′, and AC to AC′. HOMOL'OGY, n. *-o-jĭ*, affinity dependent on structure or the essential correspondence of parts; in the doctrine of the corresponding relations of parts, different beings, having the same relations but different functions. Homology, in *anat.*, indicates structural correspondence, while the term *analogy* indicates functional resemblance. Thus, by homologue (q.v.) is implied 'the same organ in different animals, under every variety of form and function;' while by analogue we understand 'a part or organ in one animal which has the same functions as another part or organ in a different animal.' For example, the wings of an insect are the analogues of those of a bat or bird, but not the homologues; while the latter are homologues with the arms of man, the fore-legs of quadrupeds, and the pectoral fins of fishes. Homology, in *chem.*, denotes agreement of composition or structure in organic bodies; members in a homologous series differ by the presence or absence of certain organic radicals. In *math.*, homology is sometimes used in the sense of plane perspective. HOMOLOGICAL, a. *hō'mō-lŏj'ĭ-kăl*, pertaining to homology. HO'MOLOG'ICALLY, ad. *-lĭ*.



HOMOLOGOUS SERIES. In chemistry the term applied to a series of related compounds having similar properties. If the substances are arranged in order of increasing complexity of composition, it will be found that the composition and, therefore, the molecular weight of any two contiguous members of the series differs by a constant quantity, as illustrated by the following table:

Name of compound.	Formula.	Difference in composition.	Molecular weight.	Difference in molecular weights.
Methane series.				
Methane.....	CH_4		16	
		CH_2		14
Ethane.....	C_2H_6		30	
		CH_2		14
Propane.....	C_3H_8		44	
		CH_2		14
Butane.....	C_4H_{10}		58	
		CH_2		14
Peutane.....	C_5H_{12}		72	
		CH_2		14
Hexane, etc...	C_6H_{14}		86	

General formula, C_nH_{2n+2}.

Name of compound.	Formula.	Difference in composition.	Molecular weight.	Difference in molecular weights.
Ethylene series.				
Ethylene.....	C_2H_4		28	
		CH_2		14
Propylene.....	C_3H_6		42	
		CH_2		14
Butylene.....	C_4H_8		56	
		CH_2		14
Peutylene.....	C_5H_{10}		70	
		CH_2		14
Hexylene.....	C_6H_{12}		84	
	General formula, C_nH_{2n}.			
Acetic Acid series.				
Formic acid....	CH_2O_2		46	
		CH_2		14
Acetic acid....	$C_2H_4O_2$		60	
		CH_2		14
Propionic acid..	$C_3H_6O_2$		74	
		CH_2		14
Butyric acid...	$C_4H_8O_2$		88	
		CH_2		14
Peutoic acid...	$C_5H_{10}O_2$		102	
		CH_2		14
Hexoic acid....	$CH_{12}O_4$		116	
	General formula, $C_nH_{2n}O_2$.			

Homologous Series are very numerous in organic chemistry and a few are known amongst inorganic compounds, chiefly in the complex derivatives of silicon, phosphorus, tungsten, etc. It will be seen that the compounds in a Homologous Series can be represented by a *general formula.* Thus, in the methane series, the formula is obtained by writing down the number of carbon atoms, two added to double this number will then give the number of hydrogen atoms present in the molecule. In the ethylene series the number of hydrogen atoms present in the molecule is exactly double that of the carbon atoms. The general formula of the acetic acid series is slightly more complex. The number of hydrogen atoms is twice that of the carbon atoms and there are two atoms of oxygen present in addition. The properties of Homologous compounds change very slowly in passing regularly through the series. Thus, in the methane series, the lower members are gases, the middle ones are liquids, more or less volatile, and the higher members, with about 25 or more atoms of carbon, are solids (paraffin). The arrangement of the elements in the PERIOD SYSTEM (q.v., see also CHEMISTRY) has suggested the idea that the elements themselves are homologous, but what experimental facts we have fail to bear this out, or, at any rate, the homology is of a different kind from that described above.

HOMOLOGUE, n. *hŏm'ō-lŏg* [Gr. *homos,* same, similar; *logos,* discourse, proportion]: correspondence or equivalence of certain organs; the same part or organ in so far as regards its anatomical relation, although differing in form and functions: see HOMOLOGY.

HOMOMORPHY, n. *hō'mō-mŏr'fĭ* [Gr. *homos,* like,

similar; *morphē*, shape, form]: in *bot.*, the condition of the Compositæ when the disk florets assume the form of ray florets; the fertilization of the pistil by the pollen from its own flowers; self-fertilization. HOMOMORPHIC, a. *hō'mō-mōr'fĭk*, having the pistil fertilized by the pollen from its own flowers. HOMOMORPHOUS, a. *hō'mō-mōr'fŭs*, in *zool.*, having a similar external appearance or form.

HOMONYM, n. *hŏm'ō-nĭm* [Gr. *homōnŭmŏs*, having the same name—from *homos*, like; *onŭmă*, or *ŏnŏmă*, a name]: a word, the same in sound but different in signification. HOMONYMOUS, a. *hō-mŏn'ĭ-mŭs*, having different significations; equivocal; ambiguous. HOMON'YMOUSLY, ad. *-lĭ*. HOMON'YMY, n. *-ĭ-mĭ*, sameness in name, with difference in signification; ambiguity.

HOMOOMEROUS, a. *hō'mō-ŏm'ĕr-ŭs* [Gr. *homoios*, like, similar; *meros*, a part]: in *bot.*, applied to lichens where the gonidia and hyphæ in the thallus appear about equally mingled.

HOMOOUSIAN. See HOMOIOUSIAN.

HOMOPETALOUS, a. *hō'mō-pĕt'ă-lŭs* [Gr. *homos*, like; *petălŏn*, a petal]: in *bot.*, having all the petals formed alike; having all the florets alike in a composite flower.

HOMOPHONE, n. *hŏm'ō-fōn* [Gr. *homos*, like; *phonē*, sound]: a letter or character having the same sound as another. HOMOPHONOUS, a. *hō-mŏf'ŏ-nŭs*, having the same sound; of the same pitch. HOMOPH'ONY, n. *-nĭ*, sameness of sound.

HOMOPLASMY, n. *hō'mō-plăz'mĭ* [Gr. *homos*, similar; *plasma*, anything formed]: in *bot.*, the phenomenon of the resemblance in odors of different orders of plants.

HOMOPTERA, *hō-mŏp'tĕr-a* [Gr. *homos*, the same, uniform, *pteron*, wing]: according to some entomologists, an order of insects; according to others, one of the two great divisions of the order *Hemiptera* (q.v.), differing from the *Heteroptera* in having the first pair of wings of uniform substance throughout (whether perfectly membranous, or somewhat leathery, and so passing into elytra), and the rostrum or sucker originating from the inferior part of the head near the thorax, or even between the first pair of legs. The Homoptera feed on the juices of plants, and some of them are very troublesome to farmers and gardeners. The females of many have an *ovipositor*, by means of which they pierce plants, to make a place for the reception of their eggs. The larvæ are active, and resemble the perfect insect, but are wingless. The pupæ also are active, and have rudimentary wings. Among the Homoptera are Cicadas, the largest of the order, Lantern-flies, Froth-hoppers, Aphides, and the Coccus tribe.

HOMOTAXIS, n. *hŏm'ō-tăks'ĭs* [Gr. *homos*, similar; *taxis*, arrangement, position]: in *geol.*, a term applied to

strata occupying the same place or position in the stratified systems, but which may, or may not, be contemporaneous. HOMOTAXEOUS, a. *hŏm'ō-tăks'ē-ŭs,* that may, or may not, be contemporaneous; also HOMOTAXIAL, a. *hŏm'-ō-tăks'ĭ-ăl,* same sense.

HOMOTONY, n. *hŏm-ŏt'o-nĭ* [L. *homotonos*—from Gr. *homos,* same; *tonos,* tone]: the act or state of keeping to the same tone; monotony. HOMOT'ONOUS, a. *-nŭs,* of the same tenor or tone; equable; applied to such diseases as keep a constant tenor of rise, state and declension.

HOMOTROPAL, a. *hō-mŏt'rŏ-păl* [Gr. *homos,* like; *tropē,* a turning]: in *bot.,* having the same general direction as a body of which it forms a part; applied to the slightly curved embryo when it has the same general direction as the seed.

HOMOTYPE, n. *hō'mō-tīp* [Gr. *homos,* like, similar; *tupos,* form, a type]: that part of an animal which corresponds to another part; correspondence of parts which lie in series, as the bones of the foot with those of the hand. HOMOTYPY, n. *hō-mŏt'ĭ-pĭ,* the state or condition of such correspondence. HOMOTYPIC, a. *hō'mō-tĭp'ĭk,* pertaining to; homologous.

HOMS, or HUMS. See HEMS.

HOMUNCIONITE, n. *hŏm-ŭn'sĭ-on-īt* [L. *homuncio,* a little man, a manikin; dimin. of *homo*]: in *eccles. and chh. hist.,* one of the followers of Photinus, Bp. of Sirmium, who, 343, maintained that only the Father was a divine personality, that the Word of God was His understanding, and the Holy Spirit one of His attributes. Jesus he believed to have been a mere man, adopted by God as a son on account of his pre-eminent virtue and piety. After being censured by the councils of Antioch, Milan, and two councils at Sirmium, the last under Arian management, he was finally deposed from his office, dying 372.

HONAN, *hō-nân':* one of the central provinces of China; 66,900 sq. m.; pop. 35,316,800. Its capital, Kai-fung-fu, is on the Yellow river, from which it has often suffered, the river-bed being here elevated above the adjacent country. It has been overflowed nineteen times. In the reign of Fuhi (B.C. 2852), it was the cap. of China. It has suffered various vicissitudes. In the 12th c. after Christ, it was six leagues in circumference. At present, the city is uninteresting to travelers, except as the residence of the Jews of China, now dwindled to a few families.

HONAWAR, *hŏn-a-wâr':* seaport on the Malabar or w. coast of the peninsula of Hindustan; in the dist. of Kanara (north) or Honawar, presidency of Bombay; lat. 14° 17′ n., and long. 74° 30′ e., 340 m. s.e. of Bombay. It stands on the n. side of an inlet of the Arabian Sea, which receives the Gerseppa or Sheravatti from the West-

ern Ghauts. Though both the harbor and the anchorage outside have a good bottom and sufficient depth, yet, in the season of the s.w. monsoon, the surf is a serious impediment to navigation. Pop. 6,000.

HONDO, *hŏn'dō*, or HONSHIN, *hŏn'shĭn:* largest island of Japan; often improperly called Nipon or Niphon. See (correctly) NIPPON.

HONDURAS, n. *hŏn-dū'ras:* kind of mahogany brought from Honduras.

HONDURAS, *hŏn-dô'ras*, REPUBLIC OF, a country of Central America, bounded on the north and northeast by the Gulf of Honduras and the Caribbean Sea; on the southeast and south by Nicaragua; and on the southwest and west by Fonseca Bay, Salvador, and Guatemala. Estimated area, 46,250 to 46,400 square miles. The capital, Tegucigalpa, has 12,000 inhabitants. Mountain ranges, which rise to heights of 5,000 or even 10,000 feet, are massed in the western half of the republic; the Juticalpa, Camasca, and Tompocente ranges, however, are near the frontier of Nicaragua in the east.

Minerals, Woods, and Agricultural Products.—Gold is found between the south and centre; silver in almost all sections. Lead, copper, saltpeter, iron, coal, platinum, zinc, and antimony are also widely distributed. The value of ores produced in 1902 was approximately $1,000,000 (that is, 23,234 ounces of gold, 1,010,204 ounces of silver, and a considerable quantity of copper). Only about 5 per cent of the mines of the country are being worked. The forests from sea-level to an altitude of 1,000 feet, contain mahogany, ebony, dyewoods, sarsaparilla and other medicinal plants, and cabinet woods, cedar, etc. At an elevation of 1,800 feet are dense and very extensive forests of pine and similar woods. Agriculture receives more attention than formerly, and the leading product is the native maize, of which 509,049 bushels were raised in 1902, chiefly in the departments of Copán, Gracias, and Santa Barbara. Bananas and plantains are grown on 42,840 acres of territory in the departments of Cortéz, Atlántida, the Bay Islands, etc. The wheat crop in 1902 was 15,813 bushels; rice, 3,914,219 pounds. Nearly 20,000 acres are devoted to the cultivation of plaintains. Cocoanuts, lemons, and oranges are produced for export on a large scale.

Commerce and Manufactures.—The total value of imports in 1902 was 4,377,161.42 *pesos*, or about $1,750,684.68 in United States currency; of exports, 6,170,353.27 *pesos*. Imports came chiefly from: the United States (60 per cent), Germany, Great Britain, Belize, Central America, and France. Exports were sent to: the United States (two thirds of total), Great Britain, Central America, Cuba, and Germany, with comparatively small amounts to other countries. The articles exported, together with their values (in *pesos*), follow: Metals,

2,319,070.49; fruits, 1,943,168.06; cattle, 560,411; coffee, 275,826.68; hides and skins, 257,598.10; woods, 217,-459.70; tobacco and cigars, 200,851; indigo, 105,425; sarsaparilla, 80,602.50; rubber, 77,552.50; wheat and flour, 66,992; salt, 22,716.20; hats, 14,150; miscellaneous, 28,529.04. Exports to the United States were valued at 1,235,624.79 *pesos* more than imports from that country.

Population.—The total number of inhabitants, as shown (by departments) in the first paragraph of this article, is 543,741, exclusive of forest tribes. Very few of this number are of Spanish descent, the great mass of the people being Indians or Mestizos.

History.—The first place of debarkation of Christopher Columbus on the American mainland was near the present Cape Honduras, where he landed on Sunday, 14 Aug. 1502. On the following Wednesday Bartholomew Columbus landed at the mouth of Rio Tinto. The most important fact in the history of Honduras—the fact that the Indians remained in possession of so large a portion of the country that their descendants constitute the bulk of the population to-day—is a consequence of the policy observed by Cortés and his successors.

HONDU'RAS, Bay of: inlet of the Caribbean Sea, between Yucatan and Guatemala on the w., and Honduras on the s. From the adjacent countries of British Honduras and Yucatan it receives numerous streams, the chief of which is the Balize, and comprises several islands. The shore is marked by reefs.

HONDU'RAS, British. See Belize.

HONE, *hōn* [Sw. *hjon;* Icel. *hein*, a hone; W. *hoji*, to incite, to sharpen]: a stone of a fine grain used for sharpening cutting instruments: v. to sharpen on a hone. Ho'ning, imp. Honed, pp. *hōnd.*—*Hones* or Whetstones, are a particular class of stones used for sharpening edge-tools. They are usually cut into pieces about a foot in length, and from an inch to two inches thick, and either left square or rounded, according to their intended uses. The finest kind of hones are called oil-stones; these are hard, compact, and so very silicious that they readily wear down the hardest steel; they are varieties of slate, derived from the argillaceous schists of the Palæozoic period. The best are from Turkey; Bohemia also is noted for its hones; and excellent ones are found in Persia, in the Harz Mountains, in Styria, in America, Great Britain, Spain, Peru, and Siberia. The whetstones for sharpening scythes, etc., are usually of coarse-grained sandstone.

HONE, *hōn*, Philip, American merchant: b. New York 1781; d. there 1851, May 4. He was a successful auctioneer in New York, established there the first savings bank (1816), was mayor in 1826, and one of the founders of the Mercantile Library Association. Prom-

inent in national political affairs, he aided in the formation of the Whig party. His diary, a portion of which, edited by Tuckerman, appeared in 1889, contains important side-lights on the early history of the Whigs. Hone was also at one time naval officer of New York port.

HONE, WILLIAM, English author: 1780, June 3—1842, Nov. 8; b. Bath. He published a number of clever political satires, *Ancient Mysteries Described*, an edition of Strutt's *Sports and Pastimes*, etc.; but is best known by his *Every-Day Book* (1826-7), his *Table Book* (1827-8), and his *Year Book* (1829), three publications which contain much curious and useful information, and which have been more than once imitated. He was arrested and repeatedly tried for his biting satires on govt. officials (illustrated by Cruikshank): in each case he was acquitted amid demonstrations of great popular enthusiasm. In his later years he became very devout, and frequently preached in Weigh House Chapel, Eastcheap. He died at Tottenham.

HONESDALE, *hōnz'dāl:* flourishing borough in the n.e. of Pennsylvania, 124 m. from Harrisburg. It is at the confluence of the Lackawaxen and Dyberry creeks, and connected by canal and railway with New York. It is the centre of a coal-district. It contains a foundry, tanneries, glass-works, mills, newspapers, etc. Pop. 3,000.

HONEST, a. *ŏn'ĕst* [OF. *honeste*—from L. *hones'tus*, honorable—from *honos*, honor: It. *onesto;* F. *honnête*]: fair in dealing with others; just; frank; hearty; sincere. HON'ESTLY, ad. *-lĭ*, uprightly; justly. HON'ESTY, n. *-tĭ*, upright conduct or disposition; fairness in dealing with others.—SYN. of 'honest'; upright; true; chaste; just; righteous; creditable; honorable; open; trusty; faithful; equitable; rightful; frank; candid; fair;— of 'honesty': sincerity; integrity; probity; uprightness; honor; justice; equity; candor; veracity.

HONESTY, *ŏn'ĕs-tĭ* (*Lunaria*): genus of plants of nat. ord. *Cruciferæ*, of which two species, natives of s. Europe, *L. annua* or *biennis*, and *L. rediviva*, have long been cultivated in flower-gardens of countries farther north, partly for the beauty of their flowers, and partly for the curious appearance of their large flat seed-pouches (*silicules*). The origin of the English name is doubtful. Some of the older English poets mention the plant as *Lunarie*. It was regarded, in the days of superstition, as possessing extraordinary virtues.

HONEY, n. *hŭn'ĭ* [Dut. and Ger. *honig;* Icel. *hunang;* AS. *hunig*]: the sweet substance collected by bees; sweetness. HONEYED, or HONIED, a. *hŭn'ĭd*, sweetened in a figurative sense, as *honeyed words;* sweet; luscious. HONEYCOMB, n. the wax cells containing the honey—so named from a fancied resemblance to a comb. HONEY-

COMBS, in *guns*, flaws resembling cells made by bees: they are worked in the metal by the action of exploded gunpowder, spread rapidly, and by continuous firing soon render the gun dangerous. HONEYCOMBED, a. *-kōmd*, applicable to any surface having small irregular punctures spread over it, like the cells of the honeycomb—we even speak of a mountain as honeycombed with caverns. HON'EYMOON, n. the first month after marriage. HONEY-MOUTHED, soft or smooth in speech. HONEY-STALKS, in *OE.*, clover and their stalks. HONEY-TONGUED, fair and smooth of speech. *Note.*—The primary meaning of HONEYMOON, appears to have been 'the first period of prosperity and enjoyment in any business or undertaking.'

HONEY, n. *hŭn'ĭ*, or HINNEY, n. *hĭn'nĭ* [Gael. *ionmhuin*, dearly beloved: Bret. *inni*, a woman, a girl]: in *familiar language*, a term of endearment among the Irish and Scotch—applied to a girl or woman; in *N. of Eng.*, applied to both sexes. HON'EYING, n. in *OE.*, making love.

HONEY: A sweet substance obtained by bees and other insects from flowers (See BEES) and used as food or stored as food for the young. Honey is nutritive, especially as a fuel for the energies of the body, as four-fifths of its components are carbohydrates, the remainder being water with a trifle of protein. The saccharine elements are mainly grape-sugar and some fruit-sugar. The properties and the flavor and color of honey vary with the qualities of the flowers from which it is made. Thus in Europe the white Narbonne honey, of France, is said to owe its peculiar and delicious flavor to the rosemary and other labiate flowers on which the bees feed. The Grecian honey also stands in high estimation. Mt. Hymettus in Attica has been famous since classic times for this product; but that yielded by the bees who range the thyme-covered hills of Corinth is said to excel it. Another famous ancient source of supply was Sicily, especially about Mt. Hybla; and Corsica is yet celebrated for its honey and wax, which in ancient times were the chief exports of that island. In the eastern United States the early light-colored honey obtained from the blossoms of the white clover, is especially esteemed; also that derived from raspberry plantations, bass-wood flowers and the like; while that made later in the summer from buckwheat is in favor among darker varieties. As the aromatic agreeable flavors and healthful qualities of special flowers apparent in ordinary good honey, so certain bad qualities are retained and spoil some honey, which thereby becomes deleterious to the human system, acting as a nauseant, a purgative, affecting the nerve-centres or even seriously poisoning those who eat it. Xenophon in the *Anabasis* (Book IV) describes the honey of Trebizond as having produced the effect of

drunkenness on the whole army who ate it. Later investigators have confirmed these reports of the deleterious effects of Trebizond honey and have considered them to be due to the fact that the bees extract the honey from the *Azalea Pontica*. In the U. S. poisonous properties are found in the honey made from the flowers of mountain laurel (*Kalmia*), and some other toxic plants.

Before the general manufacture of cane-sugar, honey was largely depended upon for purposes of sweetening, and was consequently of much greater importance than it now is, as may be inferred from the frequent references to it in the Bible as a sign of abundance. It is still used as a food and in moderate quantities is generally nutritive and healthful, though some persons are unable to eat any kind of honey without disarrangement of the digestion or nerves, or both. It has well-recognized medicinal properties, especially as a demulcent against hoarseness, catarrh, etc., in promoting expectoration in disorders of the breast, and as an ingredient in cooling and detergent gargles. Its effect is usually laxative also. It is used to sweeten certain medicines; and is sometimes mixed with vinegar in the proportion of two pounds of clarified honey to one pint of the acetic acid, boiled down to a proper consistence over a slow fire, and thus forms the oxymel simple of the shops. It also enters into the composition of various sweetmeats, especially in the East, such as the genuine Oriental nougat.

Hence honey has a considerable commercial importance, and the industry of bee-keeping is carried on for the purpose of supplying the market demand. Modern hives are so constructed that the bees build separate combs each filling a box with glass sides, which are taken out and sent to market as the bees finish them. Another method of marketing is in the form of 'strained' honey, the liquid pressed from the comb after warming, through sieves of linen cloth, or by other means. There is no reason why this should not be as good as that left in the comb, if properly prepared and preserved, and it permits of saving the material of the combs for wax (q.v.); but it makes possible adulteration, which is freely taken advantage of. The chief adulterant is commercial glucose, which occasionally is substituted to the extent of three-fourths of the volume, leaving only enough real honey to flavor the mass. As glucose (grape-sugar) is a large constituent of this substance in nature no great harm results (when the glucose is good), beyond the deception; and wholly artificial honey has been largely sold in the past as the product of bees.

Both the French and the Greek honey are highly esteemed, but the U. S. is the greatest honey-producing country and exports large quantities annually.

HONEY BUZ'ZARD, or PERN (*Pernis*): genus of *Falconidæ*, allied to kites and buzzards, but differing from them, and from all other *Falconidæ*, in having the

lore, or space between the eye and the bill, closely covered with feathers, which overlap one another like scales. The food of honey buzzards consists, not of honey, but chiefly of bees, wasps, and their young, in quest of which these birds dig up the ground, to get at the nests of the insects. They feed also partly on other insects, and less frequently on lizards, small birds, etc.

HONEYCOMBING: a form of boiler corrosion consisting of numerous blank holes or pits. It is due to the action of acids, to galvanic action, or to a lack of uniformity in the quality of the plates. In cloth-manufacture, a term applied to designate a thin fabric in which the stitches, running diagonally across the material, have been drawn up in such a manner that the spaces between them are puffed or in relief.

HONEYCOMB MOTH or WAX MOTH (*Galleria*): genus of small moths of the same tribe with clothes' moths, of which some species are remarkable for infesting bee-hives. There they deposit their eggs; and the larvæ feed on the honey-comb, through which they make tunnels lined with silk, and in the midst of which they finally spin their cocoons and undergo their transformations. The cocoons are often united in little heaps. These moths, when numerous, are very injurious, and sometimes quite destructive to the bees, from whose stings they seem to have perfect immunity. *G. mellonella* or *cereana*, perhaps the most destructive species, is about an inch in extent of wings; *G. alvearia* not much more than half an inch. Both have a satiny appearance, and are among the worst enemies of the bee-keeper.

HON'EY-DEW: viscid saccharine exudation often found in warm dry weather on the leaves and stems of trees and herbaceous plants. It is usually, but not always associated with the presence of *Aphides Cocci*, and other insects which feed on the juices of plants, and its flow is ascribed to their punctures; but the rupture of the tissues from any other cause, such as the state of the weather, also appears to produce it, and warm dry weather seems necessary for production in the sap of that superabundance of sugar which is thus thrown off. Aphides themselves exude by certain peculiar organs (see APHIS) drops of a fluid called honey-dew, which probably differs considerably from the direct exudation of the plants on which they feed, but mingles with it where they abound. Honey-dew is often so abundant as to fall in drops from one leaf to another and upon the ground, sometimes falling from trees even as a copious shower. Different kinds of manna are the dried honey-dew or saccharine exudation of certain plants: see MANNA. But very generally, this exudation, as it dries, coats the surface of leaves and branches with a clammy film, to which everything brought by the atmosphere adheres, and on which molds and other small fungi soon

grow, and thus the pores of the plant are clogged and its health is impaired. Gardeners are therefore careful to wash off honey-dew with the syringe. Orange and lemon plantations sometimes suffer great injury from the abundance of honey-dew; and it has caused very great loss in the coffee-plantations of Ceylon.

HON'EY-EATER, or HON'EY-SUCKER: name sometimes given to some of the Sun-birds (q.v.), but also the common name of a large family of birds nearly allied to these and to humming-birds, and peculiar to Australia and the islands of that part of the world. This family, *Meliphagidæ*—of order *Insessores*, and tribe *Tenuirostres*—has a long curved sharp bill, not so slender as in humming-birds and sun-birds; the tongue terminates in a pencil of delicate filaments, the better to adapt it for sucking honey from flowers, or juices from fruits. These are a principal part of the food of the honey-eaters, but they devour insects also in great numbers. They are birds of elegant form and generally of gay plumage. Most of them have a long and broad tail. They may be observed fluttering and darting among trees and shrubs when in blossom, and are very abundant in all parts of Australia. They are extremely vivacious and active, and keep up a continual chattering. One of the most splendid species, *Meliphaga* or *Ptiloris paradiseus*, is called the Rifleman or Rifle Bird by the Australian colonists. Another species, *Myzantha melanophrys*, is called the Bell Bird, because its voice much resembles the tinkling of a little bell. To this family is referred the Poe Bird, Parson Bird, or Tui-tui (*Prosthemodera Novæ-Zeelandiæ*) of New Zealand, a bird larger than a blackbird, and of deep metallic green color, becoming bronze and black in certain lights, with snow-white tufts of downy curling feathers on the sides of the neck. Unlike most of the *Meliphagidæ*, it is a bird of fine song. It has, also great powers as a mocking-bird, readily learns to speak many words, and becomes very familiar in domestication.

HON'EY-GUIDE, or IN'DICATOR, or MOROC (*Indicator*): genus of birds ranked in the Cuckoo family, but differing from the true cuckoos in characters which show approach to woodpeckers, also, in some respects, to creepers. They all are natives of Africa, and are found in almost all parts of it. They have acquired their name from guiding men to honey; a curious instinct prompting them to flutter near the traveller with frequent repetitions of a cry which resembles the syllable *cherr;* and it is said that, if followed, they almost always lead to a place where a bees' nest may be found.

HON'EY-LO'CUST TREE (*Gleditschia triacanthos*)—known also as the SWEET LOCUST, and BLACK LOCUST, and in Britain as the THREE-THORNED ACACIA: lofty and beautiful tree of nat. ord. *Leguminosæ*, sub-ord. *Cæsal-*

pinieæ, native of the valleys of the Alleghanies, and of the basin of the Mississippi. It is not found wild on the Atlantic coast of N. America, though often planted for ornament near dwellings. The flowers—small, greenish, and in spikes—have, when perfect, six stamens and one pistil, but are generally unisexual. The leaves are twice pinnate, without terminal leaflets, the numerous small leaflets giving peculiar gracefulness to the foliage, which is of light shining green. The tree is furnished with numerous sharp spines. The pods are long, flat, pendulous, often twisted; the seeds are large, brown, and enveloped in a pulp, which, when the pod is ripe, is very sweet. Sugar has been made from it, and when fermented, it yields an intoxicating beverage, in use among the American Indians. The honey-locust attains a height of 70 or 80 ft. The wood resembles that of the American Locust Tree (q.v.), or False Acacia (*Robinia pseudacacia*), but is more coarse-grained.

HON'EYSUCK'LE (*Lonicēra*, or, according to some botanists, *Caprifolium*, which others make a sub-genus of *L.*): genus of plants of nat. order *Caprifoliaceæ*. They are shrubs, often twining, and have the flowers either in whorls or in pairs. The calyx is short and 5-toothed; the corolla tubular-funnel-shaped, 5-cleft, generally two-lipped; the fruit a 3-celled and many-seeded berry. The COMMON HONEYSUCKLE, or WOODBINE (*L. periclymĕnum*), is abundant in woods and thickets, and on account of its beautiful cream-colored whorls of flowers and their delicious fragrance, it is often planted in shrubberies, and trained against walls. It is said to be the 'twisted eglantine' of Milton. The phenomena observed in its growth have been adduced in proof of a *perceptive power* in plants: the branches shooting out till they become unable to bear their own weight; and then, on their meeting with any other branch, twining around it, from right to left; but if they meet only with one another, twining in different directions, one to the right and another to the left. Very similar to this is the PERFOLIATE HONEYSUCKLE (*L. caprifolium*), with paler whorls of flowers, and remarkable for having the upper leaves united so that an opposite pair form one leaf, through the middle of which the stem passes. This peculiarity is confined to the flower-bearing shoots, and does not occur on the young runners; it is also most perfect nearest the flower. This species is a native of s. Europe, but now naturalized in many parts of Britain, and much planted, as, though less fragrant than the common honeysuckle, it flowers earlier. There are numerous other species, natives of Europe, Siberia, and North America. The FLY HONEYSUCKLE (*L. Xylosteum*) is an erect shrub, native of Europe and Asia. Its branches are frequently used in parts of Europe for tubes of tobacco-pipes; and it is said to make good hedges in dry soils. Other erect species are frequently planted in shrubberies.

The TRUMPET HONEYSUCKLE (*L. sempervirens*), called in the United States the CORAL HONEYSUCKLE, is a native of the southern states, often planted in the north on account of its beautiful flowers, red on the outside, and scarlet within, which, however, have no fragrance. It is a twining evergreen shrub. The berries of the honeysuckles are nauseous. The name honeysuckle is given also to shrubs very different from this genus, but of which the flowers abound in honey, as to species of *Banksia* in Australia. *Azalea viscosa* is called Swamp Honeysuckle in N. America.

HON'EYSUCK'LE, FRENCH. See FRENCH HONEYSUCKLE.

HON'EYSUCK'LE OR'NAMENT: form characteristic of eastern art. It is used in Assyrian, Persian, and Hindu architecture, and wherever used indicates an eastern origin. The Greeks borrowed it from the Persians, and, by refining and improving it made it one of the most beautiful ornaments of their architecture. It is used chiefly in the Ionic style (q.v.).

HONG, n. *hŏng* [Chinese, *hang*, or *hong*, row or series of shops or rooms, a mercantile house]: in *China*, the company of merchants who were alone privileged to deal with foreigners; the buildings used for offices or counting-houses; the place where sales and purchases are made.

HONG-KIANG' or WES'TERN RIVER. See SI-KIANG.

HONG-KONG, *hŏng-kŏng'* — properly HIANG-KIANG ('Fragrant Streams'): British island off the s.e. coast of China, in the estuary of the Chu-Kiang, about 75 m. s.e. of Canton. It is nine m. long from two to six broad; about 29 sq. m. The cap., Victoria, lat. 22° 16½′ n. long. 114° 8½′ e., has pop. about 92,000, of which nearly 6,300 are Europeans and Americans (comprising almost all of that race on the island). The total public income is about $5,000,000, and the expenditures about the same.

The island is covered to the shore with mountains, the peaks ranging from 1,000 to nearly 2,000 ft. high. The mountains consist chiefly of granite, syenite, serpentine, and trap; granite quarries are skilfully worked by the Chinese. In the early years of the colony, when the ground was being broken up for building purposes, European settlers suffered much from febrile and other diseases, and the island had an unenviable reputation for unhealthfulness. Now, however, in this respect Hong-Kong may compare favorably with any other British possession in the east. For about six months, from May to Oct., the heat is oppressive in the extreme, being accompanied with much rain and damp. During four of the winter months, the weather is cool, dry, bracing, sometimes even cold; but the change from the high and moist temperature of summer to a dry cold is apt to produce dangerous diseases, more especially of the kid-

neys. The temperature in summer ranges from 83° to 90°, and in winter from 40° to 75°. On the mainland, opposite the n. shore of the island, and separated from it by the harbor, which varies from half a m. to four m. in width, is the Kow-loong Peninsula, a strip of coast territory and portion of the township of the same name ceded to the British govt. by the convention of Pekin, 1861, Oct. 24.

Victoria, the capital, is on the n. shore of the island, on a small bay surrounded by mountains. It is laid out in magnificent streets and terraces, and has abundant supply of good water from a large reservoir on the s. side of the island. The harbor is commodious and safe; the roadstead has a depth of 3 to 7 fathoms, and good anchorage. At Aberdeen, on the s. side of the island, and at Kow-loong, there are docks capable of taking the largest steamers. Between Victoria and Canton and Macao, communication by steam is obtained daily, and since the opening of the Suez canal the same may be said of Shanghai, Yokohama, Bombay, Calcutta, and Singapore, so that the magnificent harbor presents a most stirring appearance. In 1901 the imports from the United Kingdom were valued at £2,612,725, the exports from Hong-Kong thither, £602,841. Here mercantile houses centralize their operations; yet Hong-Kong occupies only a secondary rank in the commerce of China. The bulk of the merchandise from Europe goes direct to the place of its destination, without touching this port; in the same manner, teas and silks pass through Hong-Kong only when it is a port of call for the steamers carrying them. The import trade of Hong-Kong is chiefly in opium, in English cotton and woolen goods, and in metals, in repairing vessels, and in the transfer of passengers. One of the most flourishing of British colonies, Hong-Kong is destined to further extension and importance, and will rise with the gradual increase of the commerce of e. Asia. A small species of deer is found on the island. Among reptiles there are several species of non-poisonous snakes, one species of the boa which reaches a length of eight or nine ft., and the cobra. Lizards also abound.

In 1843 this island was ceded in perpetuity to her Britannic majesty by the treaty of Nankin, having been occupied, as a preliminary measure, 1841. Its affairs are ruled by a gov. and legislative council. Pop. (1901) 283,905.

HONITON, *hŏn'ĭ-ton or hŭn'e-ton:* small market-town and municipal borough of England, county of Devon, beautifully situated in a graceful and highly cultivated valley, near the left bank of the Otter, 16 m. n.e. of Exeter. The old church contains a light and elegant oak-screen, erected 1482 by Courtenay, Bishop of Exeter. Honiton has long been famous for the lace, named from the town in which it is the chief branch of manufacture.

It is made by hand on a *pillow:* its manufacture was introduced into England by the Lollards during the reign of Elizabeth. The vale of Honiton is noted for its butter. Pop. 3,216.

HONITON-LACE. See HONITON.

HONOLULU, *hō-nō-lōlō:* seaport and capital of the Territory of Hawaii, lat. 21° 18′ n. and long. 157° 51′ w., on the s.w. or leeward coast of Oahu, one of the islands of Hawaii (q.v.); one of the very few spots in Polynesia that can fairly claim to be reckoned an integral part of the world of commerce and civilization. Its central position at the 'Cross Roads' of the Northern Pacific, makes it important both in a commercial and a strategic point of view. It is connected by lines of steamers with San Francisco, Salina del Cruz, Vancouver, Japan and China, Manila and the Australasian Colonies. The completion of the Panama Canal will add greatly to its importance. During the year ending 1904, June 30, 411 vessels of 861,310 tons entered the port. Its total foreign commerce for the year 1899 was $32,000,000. The total assessed value of taxable property in the city in 1905 was $45,008,473. The harbor is entered by an opening through the coral reef, which has been dredged to the depth of 34 feet. The mean temperature is 73°F., the maximum and minimum observed being 52° and 89° respectively.

The public buildings would do credit to a much larger city. It contains 4 banks, 3 first-class hotels, 15 churches, 2 theatres, 5 hospitals, the Lunalilo Home for aged and indigent Hawaiians, an asylum for the insane, etc. It has a well-equipped paid fire department, public water works, electric light works, and systems of electric cars and telephones. The public library and the Bishop Museum of Polynesian Ethnology are worthy of mention.

There are 19 public schools with 124 teachers and 4,739 pupils, and 30 private schools with 180 teachers and 3,055 pupils. This statement includes the Normal School, High School, Oahu College and St. Louis College. The city also boasts of an Art League and numerous benevolent, literary, social and political societies. Pop. (1910) 52,183, of whom about 10,000 were native Hawaiians, 15,000 Asiatics, 5,000 Portuguese and 8,000 Americans and northern Europeans.

HONOR, n. *ŏn′ėr* [OF. *honeur*—from L. *honōrem,* honor, respect: It. *onore;* F. *honneur,* honor: Gael. *onoir,* honor]: the esteem paid or due to worth; any expression of high respect; worship; high rank or place; civilities; dignity; fame; scorn of meanness, the result of self-respect; token of respect; chastity; glory; he who or that which honors: v. to respect highly; to treat with deference or submission; to raise to distinction or notice; in *commerce,* to accept and pay when due, as a bill of exchange. HON′ORING, imp. HONORED, pp. *ŏn′ėrd.* HON-

ORARY, a. *ŏn′ėr-ă-rĭ*, intended merely to confer honor; unpaid. HONORABLE, a. *ŏn′ėr-ă-bl* [F. *honorable*—from L. *honorābĭlis*]: deserving or implying honor; high-minded; actuated by the principles of honor; of high rank in society; used as a title of rank or high office, as *right honorable:* without taint or reproach. HONORABLE ORDINARIES, in *her.:* see ORDINARIES. HON′ORABLY, ad. *-ă-blĭ*, with tokens of honor; generously. HON′ORABLENESS, n. *-ă-bl-nĕs.* HON′ORS, n. plu. privileges of rank or birth; public marks of respect or esteem; high academic distinctions; the highest cards held in the game. MILITARY HONORS—NAVAL HONORS: see SALUTES. LAWS or CODE OF HONOR, certain arbitrary rules by which social intercourse is regulated among persons of fashion. ON ONE'S HONOR, on the pledge of one's own reputation for integrity. TO DO THE HONORS, to pay respect and attention to guests in the manner of a host, as at a private or public dinner. YOUR HONOR, a common and familiar title of respect paid to untitled gentlemen by many persons in the humbler ranks—still given to some English judges. AFFAIR OF HONOR, a dispute or quarrel, as in connection with the laws of honor, which the disputants consider can only be settled by a duel. DEBTS OF HONOR, debts contracted in gambling, horse-racing, by verbal promise, and the like, which cannot be enforced in a court of law. MAIDS OF HONOR, ladies who attend upon the queen. POINT OF HONOR, an obligation whose non-fulfilment would offend the conscience, or a feeling of self-respect. —SYN. of 'honor, n.': boast; renown; reverence; veneration; ornament; decoration; purity; integrity; rank; reputation; magnanimity;—of 'honorable': illustrious; noble; great; magnanimous; generous; honest; estimable; pure; irreproachable; respected; worthy; just; equitable; fair; reputable.

HONOR, KNIGHTS OF. See KNIGHTS OF HONOR.

HONORARIUM, n. *hŏn′ō-rā′rĭ-ŭm* [L. a present made on being admitted to a post of honor, a douceur: F. *honoraire*]: voluntary fee paid to a professional man, e.g., a counsel or a physician; because such fees were presumed to be given as a present, or more correctly as a mark of honor, and beforehand, and not on the vulgar theory of payment for services rendered. The amount was not left to the payer's will, but was fixed by usage, and varied according to the eminence of the person employed. The legal effect which followed was, that neither counsel nor physician, if not paid their fees beforehand, could bring an action against the client to recover them. This is still the case in the United Kingdom as to counsel, but not as to registered physicians, who can now recover their fees by action. In the United States, the Honorarium is not a recognized usage; but the term is used in a general way to designate any compensation that can not be measured by rule. See FEES of Lawyers and Physicians. HONORARY. See HONOR.

HONORIUS, *hō-nō'rĭ-ŭs*, FLAVIUS AUGUSTUS: Emperor of the West: 384–425 (reigned 397–425); second son of Theodosius the Great. On the death of his father, the empire was divided into two parts, H. receiving the western half, with Rome as his capital; but being young, he was put under the guardianship of Stilicho (q.v.), who was all his life the *de facto* ruler of the Western Empire. H. first took up his residence at Milan, where, 398, he married Maria, daughter of Stilicho. The most important events of H.'s reign were the various treaties concluded with the German tribes who dwelt on the Rhine and Upper Danube; the rigorous persecution of paganism 399; and the devastation of n. Italy by Alaric and his Visigoths 400–403. Stilicho was then in Germany; but on his return he speedily cleared the country of the invaders, after totally defeating them at Pollentia (403, Mar.). Another irruption of barbarians, under Rhadagaisus, took place 405–6, which was again repelled by the powerful arm of Stilicho. Nevertheless, this brave soldier and able minister lost the favor of his weak and worthless master, and was treacherously slain at Ravenna 408. Alaric was not slow to take advantage of the opportunity thus afforded him. In 408, he invaded Italy, and besieged Rome, which escaped only on payment of a heavy ransom; and in the following year he again besieged and took it, raising Attalus to the imperial purple. The death of the invader 410, after having a third time besieged Rome, again freed Italy. A new champion of the falling empire arose in the person of Constantius, who having suppressed the rebellions of Constantine, Jovinus, and Sallustius in the northern provinces, and of Heraclian in Africa, was appointed the colleague of H. in the consulship, and received in marriage the hand of Placidia, sister of H., with a share in the empire, which he did not long retain, as his death took place a few months afterward. The Gothic and German tribes had for some time been slowly but steadily encroaching on the Western Empire, and H.'s reign saw Spain, Gaul, and Pannonia, some of the finest provinces, snatched from its grasp. H. was weak and foolish, and when excited by fear or jealousy, he was cruel and treacherous, as was evinced in his treatment of Stilicho and Constantine.

HONO'RIUS I., Pope of Rome: b. in Campania, of a consular family; ruled 625–638, succeeding Boniface V. He has been the subject of much controversy between Rom. Catholics and Protestants, and between the Gallican and Ultramontane schools of the Roman Church. Of his early history, little is known, except that he was active in bringing to a close the disputes in n. Italy about the controversy of the Three Chapters (q.v.). His general administration of church affairs has been favorably judged by historians; and his name is connected especially with the history of the paschal controversy in Ireland, and with that of the early Anglo-Saxon Church. But his pontificate is memorable particularly on account of the Monothelistic heresy: see MONOTHELISM. H. is connected therewith rather negatively, than by any positive participation in the spread of the

Monothelite doctrine. While the controversy was yet new in the West, Sergius, Patriarch of Constantinople, wrote to H., to explain the Monothelistic doctrines in the most favorable light, and to suggest that it would be most desirable to impose silence on both parties, in a dispute which really did not affect the substance of the catholic doctrine. H., misled it is alleged by this statement of Sergius, consented, and even expressed himself in language which appeared to condemn the doctrine of two wills in Christ. The Rom. Cath. historians, however, maintain that in thus disclaiming the belief of two wills in Christ, H. merely denied the existence in Christ of two discordant or conflicting wills, that is, of a *corrupt and sinful human* will opposed to the divine will. It is not easy to reconcile this explanation with the decree of the sixth general council, in which H. is anathematized in company with many others, of whose heterodoxy there can be no doubt. But the defenders of H. reply, that though the sixth council certainly does include H. in one common condemnation with a group of heretical teachers, yet the explanation appended to the condemnation of the former, viz., that 'he had not by the exercise of his apostolic authority extinguished the rising flame of heresy, but by neglecting it, favored its progress,' clearly alludes to the error of judgment described above, by which, though himself personally orthodox, he enjoined silence on the controversy at a time when a more far-sighted ruler would have felt it his duty to interfere by a clear and explicit declaration. On the whole, they maintain that, however H. may by his imprudent silence have compromised the interests of orthodoxy, he did not put forth any such dogmatic declaration as can fairly be regarded, whether by Protestants or by Gallicans, as irreconcilable with the strict ultramontane doctrine of infallibility, inasmuch as that doctrine contemplates the pope as 'speaking from the apostolic chair.' Some letters of his are preserved in Labbe's *Coll. Conciliorum*, III.

HON'ORS OF WAR: privileges allowed to a garrison surrendering, either in consideration of a brave defense, or from some other cause. Many degrees of honor may be paid to a vanquished enemy, according to the generosity or judgment of the victorious commander-in-chief. In some cases, the garrison is allowed to march out with all its arms, drums beating, colors flying, etc.; at another time, the conquered force will be permitted only to advance silently to the front of their works, there to ground or pile arms, and then, facing about, to return to their lines as prisoners of war. Occasionally, the capitulation will provide that the garrison shall deposit their arms and warlike stores at some specified spot, and then march on to their own territory on parole of not serving during the existing war against the victors or their allies.

HONTHEIM, *hŏnt'hīm*, JOHANN NIKOLAUS VON: 1701, Jan. 27—1790, Sep. 2; b. Treves: zealous opponent of Ultramontanism. He was educated in the Jesuit school of his native city, studied canon law at Louvain under the

celebrated Van Espen, and afterward taught it for ten years at Treves, of which see he became coadjutor 1748, with the title of bishop *in partibus infidelium.* He is the author of two voluminous works on the history of Treves, *Historia Trevirensis Diplomatica* (3 vols. fol. 1750), and *Prodromus Hist. Trevirensis* (2 vols. fol. 1757). His literary career is memorable for a theological essay, which, though with very mean pretensions to learning, by the novelty and boldness of its views, made an immense sensation in the theological world. The title of this work, which was in Latin, and dedicated to Pope Clement XIII., is 'On the State of the Church and on the Legitimate Authority of the Roman Pontiff,' a work composed with a view to the reunion of Christian sects. The name of the author was long unknown, the work being published under the *nom de plume* of Justinus Febronius (a name said to be taken from that of Hontheim's niece, who was called Justina Febronia), whence the system of church government which the work propounds has been called Febronianism (q.v.). His scheme may be described as an exaggerated form of Gallicanism, vesting the supreme authority of the church not in the pope but in a general council, with the democratic element of congregationalism superadded. The work immediately after its appearance was condemned by Clement XIII., as well as by many individual bishops. It drew forth a number of replies, the most important of which are those of Zaccaria (1767) and Ballerini (1768). Pius VI., 1778, required from Hontheim a retractation of these doctrines. This retractation, however, was modified by a subsequent *Commentary,* published at Frankfurt 1781, to which, at the desire of the pope, Cardinal Gerdil replied. Hontheim eventually made full submission to the church. He died at Montquinten in Luxemburg.

HONVÉD [Land-defenders]: name given in Hungary under the earlier kings to the national champions. With the disappearance of these, the word too disappeared; but in the summer of 1848 it was revived, and applied first to those Hungarian volunteers dispatched to the south against the Servians, and subsequently, when the war with Austria really commenced, to the whole patriotic army. Since the reconstitution of Austrian affairs after 1866, the name Honvéd has been given to the Landwehr of the Hungarian portion of the empire.

HOOBLY, *hō'blē* (*Hubli*): town of Dharwar (q.v.), province of Bombay, about 230 m. s.e. of Poona. It is one of the principal cotton markets in that part of India. A good road has been constructed to the Malabar coast, by which the raw cotton of the neighborhood is easily and cheaply transported for shipment. Pop. (1901) 60,214.

HOOCH, or HOOGH, PIETER DE, *pē'tėr dė hooch,* or *hōg:* Dutch painter; b. Utrecht 1630; d. Amsterdam soon after 1677. His early art training was much influenced by Rembrandt. In 1655, he was enrolled in the Painters'

Guild of Delft, where he resided, but later removed to Amsterdam. He was the chief representative of Dutch genre painting, and his specialty was the delineation of Dutch interiors, with their semi-darkness, suffused by the witchery of sunlight. Sometimes he set out two or more rooms in perspective, the vista of which was drawn and lit up with extraordinary skill.

HOOD, n. *hŭd* [Low Ger. *hode;* Ger. *huth,* guard, keeping: Dut. *hoed,* a hood—from *hoeden,* to cover]: a covering for the head and shoulders, attached to a cloak or a monk's frock at the back of the collar; a covering drawn upon the head and wrapping round it, leaving the face only exposed; a covering for a hawk's head; an ornamental fold which hangs down the back of a graduate to mark his degree; in *bot.,* a concave petal resembling a monk's hood: V. to dress or cover with a hood. HOOD'ING, imp. HOODED, pp.: ADJ. having or wearing a hood; covered with a hood. HOOD'WINK, v. *-wĭngk,* to blind by covering the eyes; to deceive by disguise; to impose on. HOOD'WINKING, imp. HOOD'WINKED, pp. *-wĭngkt.*

HOOD, *hŭd* [Icel. *hattr,* manner; *hatta,* to be wont: Bav. *hait,* the condition of a thing: AS. *had,* person, state]: a common postfix, denoting quality, state, condition, character, as man*hood,* priest*hood.*

HOOD, JOHN BELL: American soldier: b. Owingsville, Ky., 1831, June 29; d. New Orleans, La., 1879, Aug. 30. He was graduated at West Point in 1853, and bore a commission in the United States Army till 1861, when he joined the army of secession. The part he took in the Virginia campaign gained for him the rank of major-general, and at Gettysburg his division made a gallant record in its position at the extreme right of the Confederate line. He took part in the battle of Chickamauga 1863, Sep. 19-20, having come to Tennessee to the support of General Bragg. When General Johnston was endeavoring in the spring of 1864 to impede Sherman's advance on Atlanta, Hood was a lieutenant-general in his army and his corps on 1864, May 25, was attacked by Hooker at New Hope Church. He succeeded Johnston the following July in the command of the Army of Tennessee, fought the battle of Peach Creek with Sherman 1864, July 20, but was compelled to retire behind the fortifications of Atlanta. After the battle of Jonesboro he retired from Atlanta, which was entered by Sherman. His attack on the forces under Schofield at Franklin being repulsed, he proceeded to Nashville, where he met General Thomas. Thomas advanced from his entrenchments on Dec. 15, and a two-days' battle ensued. Federal preparation had been carefully and deliberately made. A general attack on the afternoon of Dec. 16 caused the entire Confederate line to give way. Soon Hood's army was in full retreat toward Franklin, the larger part of it 'in great confusion,' according to Hood's official report. After a nine-days' pursuit by the Federals, the remnant

of the Confederates, now largely disintegrated, crossed the Tennessee. Hood, at his request, was relieved of his command. Subsequent to the war he was a commission merchant at New Orleans. He wrote *Advance and Retreat: Personal Experiences in the United States and Confederate States Armies* (1880), and articles for *Battles and Leaders of the Civil War* (1887).

HOOD, ROBIN: hero of several old English ballads and traditionary stories; which generally represent him as an outlaw and a robber, but of a gallant and generous nature, haunting the depths of Sherwood Forest, Nottinghamshire, and of Barnsdale Forest, Yorkshire, in an early era of English history, which it has hitherto been customary to fix in the 12th c. The earliest authentic notice of him is in the *Vision of Piers Ploughman*, a poem dating 1355-65: 'rhymes of Robin Hood and Randolph Earl of Chester' are there alluded to. About 1495, Wynkyn de Worde printed a poem of considerable length, *The Lytel Geste of Robyn Hood*—apparently a series of rude popular ballads strung together, being probably a modification of the 'rhymes' spoken of in Piers Ploughman. Thus we see evidence for a considerable antiquity to the ballads commemorating Robin Hood, a collection of which filled two little volumes printed by Ritson 1795. It is also certain that, in the early part of the 16th c., there was a widespread celebration of annual rustic sports and masqueradings, under the name of the *Robin Hood Games*, in which the deeds of the hero, and of his companions, Little John, Friar Tuck, etc., and of his sylvan mistress, Maid Marian, were represented. These even extended to Scotland, where the Reformers had some difficulty in putting them down. In the ballads and the games alike, Robin was always exhibited as a valiant man out of suits with fortune, giving to the poor much of what he took from the rich, most skilful with the long bow and the quarter-staff, and almost unfailingly victorious in personal encounters with whatsoever opponent.

In addition to these evidences of the existence of such a hero, we must remark that his grave has for ages been pointed to in Kirklees Park, Yorkshire, marked by a flat stone on which was carved a flowery cross.

While there could be little doubt that some such predatory outlaw as Robin Hood existed, and that he was of a character to excite, generally speaking, the affections rather than the reprobation of the people, there was a lack of documentary evidence regarding him, until the publication of a tract by the Rev. Joseph Hunter 1852. In this *brochure*, it is, first, shown that one of the ballads represents Robin as going, by the invitation of 'Edward our comely king,' to meet him at Nottingham; as there accepting service with his majesty; and as accompanying him to court; where, however, becoming sick almost to death with that kind of life, he did not remain longer than 15 months; after which he retired, and resumed his

wonted free and jovial life in the forest. Mr. Hunter then proceeds to show that King Edward II. 1323 made a progress through the western and midland counties, in the course of which he came (Nov. 9) to Nottingham; that in the exchequer accounts between Mar. and Nov. of the ensuing year, among the names of 24 'porteurs' of the king, to whom wages were paid, occur those of 'Robyn and Symon Hod;' and that finally, at the latter date occurs an entry—'Robyn Hod, heretofore one of the porteurs, because he could no longer work, received as a gift, by command, 5*s.*;' the name from this time appearing no more. Mr. Hunter likewise ascertained that, at a date six years antecedent to the royal progress above mentioned, the name of 'Robertus Hood' is found in the court-rolls of the manor of Wakefield, as that of defender in a suit regarding a small piece of land. The probability therefore is, that Robin Hood lived and acted as the ballads represent him only a few years before the era of Piers Ploughman, and really passed from wild forest life into the royal service for a brief space—an adventure which might appear as the most incredible attributed to him, if we did not know something of the whimsical and puerile character of Edward II., which was such that he did not disdain occasionally to seek amusement in playing at chuck-farthing with his servants. Mr. Hunter further deemed it likely that Hood was one of the yeomen who joined the discontented barons under the Earl of Lancaster, and were ruined by the failure of their enterprise. If so, his life in the forest might be rather a sort of guerrilla warfare than a practice of simple rapine; and hence it might, in some measure, arise that the 'gests' of Robin Hood became the subject of so much romantic and affectionate sentiment on the part of the community.

HOOD, Thomas: 1789, May 23—1845, May 3; b. London; son of a bookseller. After leaving school he was placed in the counting-house of a Russian merchant, but his health failing, he was sent to Dundee. At the age of 17, he returned to London, and engaged himself to learn the art of engraving with his uncle. In 1821, he was offered the post of sub-editor of the *London Magazine*, which he accepted, and at once entered on its duties and an extensive literary acquaintance. His first separate publication was entitled *Odes and Addresses to Great People.* He published *Whims and Oddities* 1826, of which a second and third series appeared during the two following years. In 1829, he commenced *The Comic Annual*, and continued it nine years. He edited *The Gem* for one year, contributing to its pages his striking poem entitled *Eugene Aram's Dream.* In 1831, he went to reside at Wanstead in Essex, where he wrote his novel of *Tylney Hall;* but pecuniary difficulties supervened, and he returned to London 1835. In 1838, he commenced the publication of *Hood's Own,* to which his portrait was

attached. Health failing about this time, he went to reside on the continent, and remained six years. In 1839, he published *Up the Rhine,* the idea of which was taken from *Humphry Clinker.* On his return to England, he became editor of *The New Monthly Magazine,* and on his withdrawal from its management 1843, he published *Whimsicalities,* consisting chiefly of his contributions to that serial. In 1845, he started *Hood's Magazine,* and contributed to it till within a month of his death. During his last illness, Sir Robert Peel conferred on him a pension of £100 a year, which was transferred to his wife. He was buried in Kensall Green Cemetery. Compare *Memorials of Thomas Hood, Collected, Arranged, and Edited by his Daughter, with a Preface and Notes by his Son* (2 vols. 1860).

Hood takes a high place both as a humorist and as a serious poet. He is great at once in comedy and pathos, and he sometimes curiously mingles and combines both. As a punster, he was supreme: he connects far-separated words and ideas by the most subtle analogies, and sends them loose. This 'fatal facility' of dealing with words as the implements for a mechanical jest, and in senses aside from their real meaning, was his supreme defect. Much of his comedy is verbal and shallow, and will be soon forgotten. It is as a poet that Hood will be remembered. His *Eugene Aram's Dream, Song of the Shirt,* and *Bridge of Sighs,* are among the most perfect poems of their kind in the English language.—His son TOM H. (1835-74) was a writer of somewhat similar though less striking gifts.

HOOD'ED SEAL, or CRESTED SEAL. See SEAL.

HOOD-MOLD'ING. See DRIPSTONE.

HOODOOISM. See VOODOOISM.

HOOF, n. *hôf* [Dut. *hoef;* Icel. *hófr;* Norw. and Dan. *hov*]: the horny substance that covers the toes of many animals. HOOFED, a. *hôft,* having hoofs. HOOF'LESS, a. without hoofs. HOOFS, or HOOVES, n. plu. *hôfs, hôvz* (see HORNY TISSUES).

HOOFS: horny covering of the feet of many quadrupeds. In some species, as the horse, they are entire; in others, as cattle and sheep, they are cloven. Serious injury to the hoofs causes lameness and severe pain, and may disable the animal for work. If driven far over hard roads, cattle and sheep are liable to become foot-sore. When the horn, which has been worn thin, regains its usual thickness, the trouble ceases. Cattle worked on roads, or on stony land, often need to have their hoofs protected by shoes. Horses, from their extensive use for driving and drawing loads, are liable to injuries of the hoofs. Shoeing is almost universal, though a few people assert that in the great majority of cases it is unnecessary. The hoofs are often injured by bad shoeing, and by allowing the shoes to remain on until the feet have

outgrown them. The shoes should be re-set every four or six weeks. Injuries to the hoofs require prompt attention. If a wound is produced, as by stepping on a nail, or by the calk of a sharp shoe, it should be cleaned and poulticed. When the inflammation subsides apply a healing balsam. Cracks in the hoofs may be caused by overwork or by improper shoeing. They should be treated by a veterinarian. Brittle and contracted hoofs, caused by standing on a dry floor, should be softened with poultices and then dressed twice a day with ointment made of equal portions of powdered charcoal, turpentine, and linseed oil. Turning the animal into a pasture for a few weeks is highly beneficial. In all serious injuries to the hoofs rest and careful feeding are essential.

HOOFT, *hōft*, PIETER CORNELLISEN: 1851, Mar. 16—1647, May 21; b. Amsterdam: Dutch historian and poet. He studied at Leyden; and travelled in France, Germany, and Italy. He died at the Hague. His chief historical works are *Het Leven van Koning Hendrik IV.* (Amst. 1626-52), and *Nederlandsche Historien* (2 vols. Amst. 1642-54; most recent edition, 1820-23). The latter of these is still of great value, and is one of the classics of Dutch literature. Hooft also translated Tacitus into Dutch. As a poet, his *Minnedigte* have not been surpassed, if even equalled, as specimens of the light Anacreontic muse. His *Letters* were published by Huydecooper 1738. His historical writings are vivid and comprehensive. His poems are chiefly in the erotic vein. He also produced dramas in the form of pastoral, tragedy, and comedy. In his comedies the domestic life of the Netherlands is admirably portrayed. In the castle of Moritz, at Muiden, he used to gather round him a coterie of brilliant men and women.

HOOGHLY, or HÚGLÍ, *hôg'lĭ:* a river of Bengal Proper; formed, in lat. 23° 25′ n., and long. 88° 22′ e., by the junction of the first two offsets of the Ganges, the Bhagrutti and the Jellinghi. From the point in question, the stream, strictly so called, is 125 m. long; the estuary, as far as Saugor Roads, measuring 35 m. more. Of all the channels by which the Ganges reaches the sea, the Hooghly is the most available for navigation. In the dry season, the tide is felt nearly up to Chandernagore, 17 m. above Calcutta. During the s.w. monsoon, the Hooghly is subject to the phenomenon known as 'The Bore' (q.v.). Up to Calcutta, the draught is seldom less than 17 ft.; but the bottom is said to be silting up. At its entrance, too, the Hooghly is much encumbered with shoals.

HOOGHLY, or HÚGLÍ, *hôg'lĭ:* district of Bengal, British India: lat. 22° 13′ 45″-23° 13′ 15″ n., long. 87° 47′-88° 33′ e.; including Howrah, 1,467 sq. m. It is bounded n. by the district of Bardwan, e. by the Hooghly river, s. by the Rupuarayan river, w. by the same river and dist. of Bardwan; drained chiefly by the Hooghly, Damodar, and Rupuarayan rivers; and has a generally flat surface,

with a gradual ascent to the n. and n.w.: and with considerable marshes between the large rivers. About $\frac{13}{16}$ of the cultivated area is in rice—the staple crop—the remainder in barley, wheat, Indian corn, peas, pulses, oil-seeds, vegetables, jute, hemp, cotton, sugar-cane, mulberry, and tobacco. The principal manufactures are silk and cotton; imports, common rice, English piece-goods, lime, and timber; exports, fine rice, silk, indigo, jute, cotton-cloth, and vegetables. Pop. dist. about 1,500,000; administrative town, same name. See below.

HOOGHLY, or HÚGLÍ: city of Bengal Proper, on the right or w. bank of the river Hooghly, 27 m. n. of Calcutta. Pop. (1901) of Hooghly with Chinsura (q.v.) immediately to the south, 35,000, of whom only 7,000 are Mohammedans. Here is a college for English and Asiatic literature, which owes its existence mainly to the munificence of a native; it has several allied schools. Hooghly is the administrative headquarters of the dist. of the same name.

HOOK, n. *hûk* [Dut. *hoeck;* Low Ger. *hake;* Icel. *haki;* Pol. *hak,* a hook]: a piece of metal or other substance bent or curved so as to catch, hold, or sustain; a curved cutting instrument; a sickle; a snare; a trap: V. to catch, draw, or fasten, as with a hook; to draw by force or artifice; to bend. HOOK'ING, imp. HOOKED, pp. *hûkt:* ADJ. bent like a hook; curved. HOOK'EDNESS, n. *-ĕd-nĕs,* state of being curved like a hook. HOOK'Y, adj. *-ĭ,* pertaining to or full of hooks. HOOK-NOSED, having a nose curved somewhat like a hook; aquiline. HOOK AND EYE, simple fastening for women's dresses. OFF THE HOOKS, disturbed; out of place; done for; dead. BY HOOK OR BY CROOK, by any means; one way or another; by foul means or by fair means, as if foully by the *hook* of the thief, or righteously by the *crook* of the bishop. ON ONE'S OWN HOOK, on one's own account; for one's self and not with others. *Note.*—This last expression arose from the practices of the N. American fishermen, in entering upon engagements with owners of fishing craft: (1) a crew would bargain for half the net value of the fishing, and receive share-and-share alike; or (2) each one of the crew would bargain to receive half of the net value of his own individual exertions, and then a fisherman was said 'to fish on his own hook.'

HOOK, *hûk,* THEODORE EDWARD: 1788, Sep. 22-1841, Aug. 24; b. London: novelist and dramatic writer. He was educated at Harrow. In 1805, at the age of 17, he produced an operatic farce, the *Soldier's Return,* which was very successful; and 1805-11, he wrote 12 other popular operatic pieces and farces. His ready wit, sparkling humor, and wonderful powers of improvisation made him the delight of society; and having pleased the prince regent by his feats of mimicry, he was appointed (1813) accountant gen. and treasurer of the Mauritius, with

salary and allowances amounting to nearly £2,000 a year. These offices he held till 1818, when the discovery of a considerable deficiency in the military chest caused him to be arrested and sent to England, and his effects seized and sold. The peculation, it afterwards appeared, had been committed by his deputy, who killed himself. On obtaining his liberty, Hook supported himself by writing for newspapers and magazines, and on the establishment of the *John Bull,* weekly tory newspaper, 1820, he was appointed its editor. From his connection with this bold, clever, and, at that time, virulent print, he derived, during its prosperous state, fully £2,000 a year. In 1823, Aug., for his debt to the government, amounting to about £12,000, he was arrested, under an Exchequer writ, and his property sold. He remained within the rules of the king's bench till 1825, May, when he was released from custody. In 1824, appeared 3 vols. 8vo, the first series of his *Sayings and Doings,* which yielded him £2,000. For a second series, 1825, and a third, 1828, he received (for each) 1,000 guineas. Several other three volumed novels were published by him in rapid succession, such as *Maxwell,* 1830; *Love and Pride,* 1833; *Gilbert Gurney,* a sort of autobiography of himself, 1835; *Jack Brag,* 1837; *Births, Deaths, and Marriages,* 1839; *Gurney Married,* 1839, etc.

HOOKAH, or HOOKA, n. *hô'kâh* [Hind. *hukkah;* Ar. *hugga*]: a pipe with a long flexible tube in which the smoke, before being inhaled, is made to pass through a water vase; a narghilé. See PIPE.

HOOKE, *hûk,* ROBERT: English natural philosopher: 1635, July 18-1703, Mar. 3; b. Freshwater, Isle of Wight. He was educated at Westminster School, and at Christ-Church, Oxford. In 1664, he was appointed prof. of geometry in Gresham College, London; and 1666, surveyor for the city of London, a most lucrative appointment. He died at Gresham College. Hooke had extraordinary inventive genius, and has justly been considered the greatest of philosophical mechanics; his wonderful sagacity, almost intuition, in deducing correct general laws from meagre premises, has probably never been equalled. There was no important invention by any philosopher of that time which was not in part anticipated by Hooke. His theory of gravitation subsequently formed part of Newton's; he anticipated the invention of the steam-engine, and the discovery of the laws of the constrained motions of planets. Among his own completed discoveries are, the law of the extension and compression of elastic bodies, '*ut tensio sic vis;*' the simplest theory of the arch; the balance-spring of watches and the anchor-escapement clocks; the permanency of the temperature of boiling-water. For the quadrant, telescope, and microscope also, we are materially indebted to him.

HOOKER, n. *hûkér.* A small Dutch vessel.

HOOKER, *hûkĕr*, JOSEPH: 1814, Nov. 13—1879, Oct. 31; b. Hadley, Mass.: soldier. He graduated at the U. S. Milit. Acad. 1837; was assigned to the artill. branch of the army; served in the Seminole Indian war and through the Me. boundary trouble; was adjt. of his regt. 1842-46; was brevetted capt., maj. and lieut.col., and promoted capt. for gallantry in the Mexican war 1846-48; resigned from the army 1853; and became a farmer in Cal., supt. of milit. roads in Or., govt. surveyor, and col. of Cal. militia. He volunteered his services to the govt. at the outbreak of the civil war; was appointed brig.gen. of vols. 1861, May 17; served in the defenses of Washington and on the lower Potomac till 1862, Apr., when he was appointed to command the 2d div. 3d corps, Army of the Potomac, with which he fought at Yorktown, Williamsburg—where his div. held the entire Confederate army in check nearly all day—Fair Oaks, Frazier's Farm, Glendale, and Malvern; promoted maj.gen. of vols. for Williamsburg; commanded his div. at Manassas, Chantilly, South Mountain, and Antietam; promoted brig.gen. U.S.A. 1862, Sep. 20, assigned to command the centre grand div. (3d and 5th corps) of the army after Burnside succeeded McClellan; and held this command at Fredericksburg 1862, Dec. 12; and appointed commander of the army of the Potomac 1863, Jan. 25. He fought the battle of Chancellorsville in May, hurried his army to cut off the Confederate invasion of Penn., and failing to obtain some support demanded, asked to be and was relieved of the command in June. In 1863, Sep., he became commander of the Army of the Cumberland, relieved Chattanooga, captured Lookout Mountain after a memorable battle above the clouds Nov. 24, was in the successful attack on Missionary Ridge, the pursuit of the Confederate army, and the action at Ringgold Nov. 26. He accompanied Sherman to Atlanta, was relieved of command at his own request 1864, July 30, brevetted maj.gen. U.S.A. 1865, Mar. 13, mustered out of the vol. service 1866, Sep. 1, and placed on the retired list as maj.gen. U.S.A. 1868, Oct. 15. He received the thanks of congress for his skill and energy in covering Washington and Baltimore when threatened by the Confederates, and as 'Fighting Joe' was beloved by all the men under him. See CHATTANOOGA, BATTLES OF.

HOOK'ER, MOUNT. See ROCKY MOUNTAINS.

HOOKER, RICHARD: author of the Books of Ecclesiastical Polity, and one of the most illustrious English theologians: abt. 1554-1600; b. Heavitree, near Exeter. He was early distinguished for 'quick apprehension of many perplext parts of learning,' and attracted the notice of Jewell, Bishop of Salisbury; through whose influence he was sent to Oxford about his 15th year. He was placed at Corpus Christi College, was advanced first to the dignity of scholar, then of fellow of his college. After about 3 years' residence as fellow, he entered into sacred orders,

and ere long (abt. 1581) was appointed to preach at St. Paul's Cross. Hither all the power and eloquence of the church found their way in the 16th c. To Hooker, however, the trial of such a public appearance was evidently considerable, according to Walton's account; and the more as the weather was unfavorable for his journey; but the diligent attendance of a Mrs. Churchman enabled him to perform the office of the day. Mrs. Churchman's kindness proved too much for the simple-minded theologian, who was led, evidently without due consideration, into a marriage with her daughter. This marriage was far from proving a source of happiness. Walton's description of the visit of his two old pupils, Edwin Sandys and George Cranmer, and 'Richard called to rock the cradle' from their company, is among the characteristic sketches of that fine old writer. The visit was made to Drayton-Beauchamp, Buckinghamshire, where Hooker had settled 1584, as a country priest. He was transferred ere long to the mastership of the Temple, by the patronage of Abp. Whitgift; and here he was plunged into the controversy with Puritanism, out of which his great work arose. Travers, one of the most zealous of the Elizabethan Puritans, was his colleague in the Temple. Travers was the more attractive and popular orator, though the less profound thinker. The colleagueship was not a happy one. The congregation 'ebbed in the forenoon,' Fuller tells us, 'and flowed in the afternoon.' 'Pure Canterbury' was in the ascendant in the morning, 'Geneva' in the afternoon. Hooker soon tired of the contention in the congregation, and the indifference of the majority to his ministry. He accordingly applied to the abp., who presented him, 1591, to the rectory of Boscum, in the diocese of Salisbury, and six m. from that city. Here he remained four years, busily employed with his great work, which his experience in the Temple probably prompted. The first four books of the Ecclesiastical Polity appeared 1584. In the same year, he was transferred to the living of Bishopshorne, near Canterbury, where he spent the few remaining years of his life, and gave to the world the fifth book of the Polity. The remaining three books were posthumous. About 1600, in the 46th year of his age, he caught cold in his passage from London to Gravesend, and gradually sank under the weakness which followed.

Hooker will always be esteemed one of the most illustrious thinkers and writers, not only in English theology, but in English literature. He is alike comprehensive and profound, tranquil and eloquent. He is speculative without mysticism, and earnest without declamation. He searches all the depths and rises to all the heights of his subject, without ever forgetting the simplicity of the Christian or breaking the charm of catholic association that binds all its parts together. More than anything he is wise and *judicious* in the highest sense of that word;

and it is the light of lofty calm and wisdom, shining through his pages, that continues to make them a delightful and excellent study, while most of the contemporary theological works are forgotten.

HOOK'ER, THOMAS: 1586-1647, July 7; b. Markfield, Leicestershire, England: clergyman. He studied theol. at Cambridge Univ., was appointed lecturer and asst. minister at Chelmsford 1626, silenced for non-conformity 1630, forced by persecution to leave England, preached in Delft and Amsterdam 1630-33, came to America with John Cotton (q.v.) and Samuel Stone, arrived in Boston 1633, Sep. 3, and settled in the present Cambridge, was chosen pastor of the 8th church organized in Mass. colony, 1633, Oct. 11, and with his entire congregation removed to Conn. 1636, June, and founded Hartford, becoming the first minister there. His publications include *A Survey of the Sum of Church Discipline* (1648), *The Application of Redemption by the Effectual Work of the Word and Spirit of Christ for the Bringing Home of Lost Sinners to God* (1657), and *The Poor Doubting Sinner Drawn to Christ* (7th ed. 1743).

HOOKS AND EYES: fastenings for dresses. Formerly made by hand; now by machines of great simplicity and beauty, with a pair of which it is possible to make 200 hooks and eyes in one minute. The operations of the machine are, first, to draw the wire forward from the supplying reel, then cut off the length required for hook or eye, as the case may be; a sinker then descends and forces it into a slot, by which it is bent, and two projecting cams, acting at the same time on the two ends, bend them over to form the lateral loops used for sewing the hook or eye to the garment; then, in the case of the hook, it is passed under another sinker, which forces the doubled wire into another slot, and forms the hook part. One side of the slot, being movable, is made to strike the bent portion of the hook sufficiently to flatten it. It is then complete, and drops out.

HOOK-SQUID: common name for cephalopod mollusks of the genera *Onychoteuthis* and *Enoploteuthis*, allied to the common squids or Calamaries (q.v.), but having the eyes destitute of any covering of skin. The arms have two rows of suckers; the tentacles much exceed them in length and are furnished with hooks at their extremities. Hook-squids are found in the Sargasso Sea, in the Polynesian Seas, etc. They are dreaded by swimmers and divers, being often of large size—sometimes six ft. long or more—while their hooks, their many arms, their very numerous suckers, and their strong, sharp mandibles, give them a place among the most formidable monsters of the deep.

HOONDEE, or HOUNDI, or HUNDI, n. *hôn'dē* [Hind. *hoondee, hundi*]: in *India*, bill of exchange; a check given by a native banker on another native banker.

HOOP, n. *hôp* or *hûp* [Dut. *hoep*, a ring: Swiss, *hup*, convex: F. *houpe*, a tuft]: a band of wood or metal used to bind together the staves of casks, etc.; anything circular: V. to fasten or bind with hoops; to encircle or surround. HOOP'ING, imp.: N. stuff for hoops. HOOPED, pp. *hôpt* or *hûpt*. HOOP'ER, n. one who. HOOPS, stiff circular bands formerly used to extend ladies' dresses; crinoline (q.v.). HOOP-IRON, narrow thin strips of iron for making hoops.

HOOP ASH. See NETTLE-TREE.

HOOPER, *hûp'ėr*, JOHN: English prelate and martyr: abt. 1495-1555, Feb. 9; b. in Somersetshire. He was educated at Oxford. By the study of the works of the German Reformers, and of the Scriptures, he was converted to Protestantism, and 1539 escaped to France from threatened persecution. He soon returned to England, but was again compelled to flee in the disguise of a sailor. He went to Germany, was married there, and settled in Zurich. After the accession of Edward VI., he returned to England 1549 and became a preacher to great crowds in London. In 1550, he was appointed Bishop of Gloucester, but his objections to wearing the Episcopal vestments caused delay in his consecration. In 1552, he received the bishopric of Worcester *in commendam;* and discharged all the duties of that office with rare zeal, diligence, and self-sacrifice, preaching three or four times a day in the towns and villages, and supplying a free dinner daily to the poor of the city whom he called to share with him in his own hall. On the commencement of Mary's reign, 1553, he was committed to the Fleet, where he remained for 18 months, being frequently examined before the council; but continuing firm in the Protestant faith, he was condemned as a heretic, and burned at the stake at Gloucester. He was author of numerous sermons and controversial treatises. His views were substantially the same as those afterward advocated by the Puritans.

HOOPER, WILLIAM: 1742, June 17—1790, Oct.; b. Boston: signer of the Declaration of Independence. He graduated at Harvard College 1760, studied law with James Otis, removed to Wilmington, N. C., to practice 1767, aided the govt. in subduing the 'regulator' insurgents 1770, was elected to the gen. assembly of N. C. 1773, and to congress 1774,5,6, served on important committees in both bodies, fled from his home on the occupation of the dist. by the British, and filled several public offices till his retirement to private life 1787.

HOOPING-COUGH. See WHOOPING-COUGH.

HOOPOE, n. *hôp'ō* [F. *huppe;* OF. *hupe*, a hoopoe; F. *houppe*, a tuft—from L. *upŭpa*, so called from its sound], (*Upupa*): genus of birds of the order *Insessores*, tribe *Tenuirostres*, family *Upupidæ*. To this family are referred also the genera *Promerops, Epimachus* (Plume-

birds), etc., natives of warm parts of Asia and its islands, Australia, and Africa, some of which are of magnificent plumage. In the whole family, the bill is long and slender, the wings are of moderate size or short, the legs short, the toes long, and the claws strong and curved. There are among them, however, great diversities, which have led some to divide them into two families, *Upupidæ* and *Promeropidæ*. The genus Promerops and its nearer allies have a close relation to the *Meliphagidæ*, which they resemble in partly feeding on the sweet juices of plants, in order to which the tongue is extensile and divided at the tip. The hoopoes, on the other hand, exhibit many points of resemblance to the crow family, with which they are connected by the choughs, and some points of resemblance even to hornbills. The tongue is short, and not extensile. The COMMON HOOPOE (*U. epops*) is a bird of n.east Africa, a summer visitant of most parts of Europe; found also in China, Siberia, and some other parts of Asia; not frequent in Britain, though sometimes seen in autumn, very seldom breeding in any part of the island. It is about the size of a missel-thrush; its plumage exhibits a fine mixture of white, buff, and black; and it has a large crest of two parallel rows of feathers. The Hoopoe derives its name from its very frequent utterance of a low soft sound resembling the syllable *hoop*. This bird, beautiful to the eye, is offensive by the foulness of its nest, and by the filth in which it seeks its food. Eight or nine so-called species have been described by some writers, but the best authorities recognize only five.

HOORN, *hōrn:* decaying town and seaport of the Netherlands, province of N. Holland; agreeably situated on a bay of the Zuider Zee, 20 m. n.n.e. of Amsterdam. It was formerly one of the most flourishing towns of its province; but, like all the towns of N. Holland on the Zuider Zee, it has greatly fallen off in trade and prosperity. There are at Hoorn extensive markets for butter and cheese, and fishing and commerce are carried on to some extent. Here the large nets for herring-fishing were invented. Pop. 10,000.

HOORN, COUNT OF (PHILIP II., DE MONTMORENCY-NIVELLE): Flemish soldier and statesman: b. about 1520; d. Brussels 1568, June 5. His father was a descendant of the French family of Montmorency, and on the mother's side he was related to Lamoral Egmont, with whose fate his own was linked. Philip was at the outset of his career one of the most influential of his order, and received from Charles V. and Philip II. important trusts and distinctions. He accompanied Philip II. to Spain, where he is supposed to have received information of the designs of the Spanish court against the Netherlands, and to have communicated them to the Prince of Orange. He was suspected by the Spanish

court, enticed to Brussels and arrested 1567, Sep., on charge of high treason. He was executed 1568, June.

HOO'SAC TUN'NEL: situated on the lines of the Boston & Maine railroad, on the route from Boston to Troy, N. Y., by way of Greenfield, and in the towns of Adams and Florida, Mass. The tunnel, which pierces the Hoosac mountain, is the longest in the U. S., being nearly 5 m. in length and sufficiently wide for two tracks. Troy is 54 m. distant from the w. end of the tunnel and Boston 137 m. from the e. entrance. The work was begun in 1856 and completed in 17 years, the total cost being over $10,000,000.

HOOSICK FALLS, *hô'sĭk:* village in Rensselaer co., N. Y., on the Hoosac river, and on the Boston & Maine railroad, about 28 m. n.e. of Albany. The river furnishes excellent water-power for its manufacturing establishments, which include paper and paper-making, machinery work, flour mills, agricultural implement works, shirt and cotton and woollen goods factories, etc. The village was first settled in 1688 and received its first charter in 1827, but this was revised in 1884 and 1890, under the last revision the government being vested in a president who holds office for 3 years, and a board of trustees, elected from the different wards. Pop. (1910) 5,532.

HOOSIER, n. *hŏ'zhér* [playfully applied to the first settlers of Indiana—either from *husher*, because they were considered as men of great physical strength, or from their rough exclamation when one knocks at a door, '*Who's yere?*']: colloq., native or citizen of Indiana.

HOOSIER SCHOOLMASTER, THE: a novel published by Edward Eggleston in 1875. It was the most popular story written by the author and the only one which attained any great degree of success. It is descriptive of the life of the pioneers of the early 19th century and the scene is laid in the states of the middle west.

HOOT, n. *hôt* [Fin. *hutaa,* to shout, to call: Norw. *hut*, a cry to silence a dog: W. hwt, off with it! away!]: a kind of shout given in contempt: V. to cry or shout in contempt; to drive with noise and shouts; to cry as an owl. HOOT'ING, imp.: N. shouting and crying in contempt. HOOT'ED, pp.

HOP, v. *hŏp* [Ger. *hüpfen;* Icel. *hoppa;* Dut. *hoppen;* AS. *hoppian,* to hop, to frisk]: to proceed by short leaps on one leg; to skip lightly; to walk lamely; to limp: N. a short leap or spring on one leg; a light leap. HOP'PING, imp.: N. the act of advancing by short leaps. HOPPED, pp. *hŏpt.* HOP-SCOTCH, a children's game, in which one hops about among a number of stones laid in regular form upon the ground, without touching any one of them, or over a diagram drawn on the ground to kick out a disk without touching the lines. See SCOTCH.—SYN. of 'hop, v.': to dance; jump; skip; leap; halt; move; play; spring.

HOP, n. *hŏp* [Ger. *hopfen;* Dut. *hop* or *hoppen;* F. *houblon,* hops: mid. L. *hupa,* the hop-plant]: climbing plant whose seeds or flowers give bitterness to beer and ale. HOPS, plu., strobili or ripened cones of the female hop plants (see HOPS, below). HOP, a. pertaining to hops: V. to impregnate with hops. HOP'PING, imp. HOPPED, pp. *hŏpt:* ADJ. impregnated with hops. HOP-BINE, n. *-bīn,* the stalk or stem of the hop. The *Hop* (*Humulus lupulus*), is a perennial diœcious plant of nat. ord. *Cannabinaceæ* (q.v.), the only species of its genus; formerly reckoned in the ord. *Urticaceæ.* It has long rough twining stems, and stalked 3-5 rough leaves, and is a plant of luxuriant growth and abundant foliage. The male flowers grow in loose branching axillary panicles, and consist of five stamens surrounded by a 5-lobed perianth. The female flowers are in *strobiles,* or cones, with large persistent, concave, entire scales, which enlarge as the fruit ripens. The part of the hop so much used in brewing, and sold under the name of *hops,* is the ripened cone of the female plant. Female plants alone, therefore, are cultivated to any considerable extent; a few male plants, scattered over a field, suffice.

The oil of hops is sedative, anodyne, and narcotic; hence the value of pillows stuffed with hops in cases of mania, sleeplessness, etc. The bitter principle is not narcotic, but it is tonic. The oil and bitter principle combine to make hops more useful than chamomile, gentian, or any other bitter, in the manufacture of beer; hence the medicinal value of *extra-hopped* or *bitter* beer. The *tannic* acid in the strobiles also adds to the value of hops, particularly as causing the precipitation of vegetable mucilage, and consequently the clearing of beer. The hop is mentioned first by Pliny as one of the garden plants of the Romans, who, it appears, ate the young shoots as we eat asparagus; and, in fact, many country people in England do the same at the present day. It is a native of Europe and of parts of Asia, a doubtful native of Britain and of N. America. It is more extensively cultivated in s. England than in any other part of the world, but also largely in Germany, France, Flanders, and s. Russia; and now successfully and to a great extent in N. America; also in Australia and New Zealand.

The cultivation of the hop was introduced into England from Flanders in the time of Henry VIII., but did not become sufficient for the supply of the kingdom till the end of the 17th c. For some time after hops began to be used in brewing, a strong prejudice existed against the innovation; and parliament was petitioned against hops, as 'a wicked weed, that would spoil the taste of the drink, and endanger the people.'

HOPS are the produce of the hop-plant. The fruit is a little nut, not larger than a grain of mustard-seed, and between its outer shell and the kernel is a small quantity of a peculiar granular substance called *Lupuline,* which

also exists as a sort of efflorescence on the surface of the scales themselves; much of the value of the hop depends on the abundance of this substance. The *lupuline* is not a mere powder, but each grain is a little organized cellular body, of an oval or round form, and, when seen under the microscope, having a reticulated surface.

Hops thrive best in rather cool climates and in locations where there is free circulation of air without violent winds. They require a rich and moderately moist soil. The land if wet must be thoroughly drained. Ground for hops should be plowed and liberally manured in autumn, and plowed again in the spring. The surface must be finely pulverized and the plants set in straight rows, the hills eight ft. apart each way, on very rich land nine feet. As planting seed gives many different sorts propagation is effected by underground runners, or slips, which are cut in pieces five or six inches long, each piece having at least four eyes. They are sold by the bushel and two or three bushels will suffice for an acre. They must be kept in a cellar, or covered with earth, until wanted for planting. Sets from male plants should be kept by themselves; enough to plant eight or ten hills per acre will be required. Planting should be done as soon as the ground is dry and warm in the spring. Furrows are usually plowed, but in mellow soil holes may be made with a dibble. Three sets are enough for a hill. They should be three or four inches apart and should be entirely covered with earth. Every eighth hill each way should be male plants. The most popular varieties in this country are the English Cluster, the Grape, and the Pompey. The latter is a large sort but in some localities rusts badly and is injured by insects.

The first season a crop of corn or potatoes can be grown between the rows. A light stake, eight ft. long, is to be placed in each hill of hops. Weeds and grass must be kept down by frequent cultivation and hoeing. When frost comes the vines are to be cut six inches from the ground and the hills covered with coarse manure. Only a small yield can be obtained the first year, and some growers neither set stakes nor try to obtain a crop. The second spring the earth should be carefully drawn away from the hills, the old vines and runners cut off with a sharp knife, and any grubs that are found destroyed. The ground is then to be plowed, the runners removed, earth hoed up to the plants, and the poles set in holes made with a crowbar or an auger. Poles should be 18 to 30 ft. long, according to the varieties of hops, and two should be set for each hill, the tops inclining a little from each other in order to give free circulation of air. The horizontal system has several advantages: the following are its distinctive features. Except for the male plants, which should have tall poles in order that the pollen may be blown over the field, the poles are only eight ft. long and but one is used in a hill. Tarred

twine connects the poles both lengthwise and across the field. It is tied only to the end poles and merely wound around the others. This method is said to give larger crops than can be grown on poles, the hops ripen earlier, are less liable to rust or be injured by high winds, the labor of picking is greatly reduced, and it is not necessary to cut the vines when the crop is harvested.

When the vines are three ft. high they should be wound around the poles with the course of the sun and tied with bass matting or woolen yarn. This should be done when the sun is shining, as the vines will break if handled at morning or night. If strings are used, the vines must be wound around them when they reach above the poles. Three strong vines are enough for a stake. If there are more they should be covered with earth. Each spring the ground must be plowed and weeds are to be kept down by constant cultivation.

Harvesting is to be done when the seeds get hard and become of a purple hue, about Sep. 1. When grown on poles the vines are cut about two ft. from the ground, the poles taken up and placed upon the supports under which large boxes are placed and into which the hops are picked by women and children. In horizontal yards the strings are loosened, thus lowering the vines, and the hops are picked into large baskets. Care must be taken to keep them free from stems and leaves. When picked, hops must be dried at once. There are various forms of kilns: temperature should be about 180°; time required for drying 8-22 hours. During the process sulphur is burned in order to bleach the hops. When half the stems will not bend without breaking, the hops are sufficiently dry. After two to four weeks they should be pressed into bales of 150 to 200 pounds. They must be kept dry and in a well ventilated place. The fibre of the vine is sometimes, though rarely, used for manufacturing purposes. The yield varies from less than 1,000 to 2,500 pounds per acre, and the price fluctuates from 5 to 50 cents a lb., and has reached $1. N. Y., Wis., and Cal. are the largest hop-producing states.

HOPATCONG, *hō-păt'kŏng*, LAKE: in the s. part of Sussex co., and on the w. border of Morris co., N. J.; on the Delaware, Lackawanna and Western railroad. It is nearly seven m. long, has its outlet in Musconetcong river, and has a post-village at Nolan's Point, 4 m. n. of Drakesville, 50 m. w.n.w. of New York. It is a beautiful sheet of water, and with its surrounding woodlands has been a popular place of summer and autumn resort for half a century. Before the advent of great hotels, it was regularly visited by clubs and families from N. Y., Penn., and N. J., who lived in tented camps during the hot season, and found sport and enjoyment in fishing and boating. The hotels have nearly monopolized the best camping-grounds, but the lake maintains its old-time popularity.

HOPE, n. *hōp* [Sw. *hopp,* hope; Ger. *hoffen;* Dut. *hopen,* to expect: Dut. *hoop;* AS. *hopa,* hope]: the desire of good, accompanied with some degree of expectation of obtaining it, or with a belief that it is attainable; anticipation of future good; the confident assurance of something future but certain, as the divine promises; the person who or thing which gives hope; trust; opinion or belief not amounting to certainty: V. to cherish a desire of good, with some degree of expectation of obtaining it; to trust in with confident anticipation of good; to place confidence in another. HO'PING, imp. HOPED, pp. *hōpt.* HOPE'FUL, a. *fŭl,* full of hope; having qualities promising success. HOPE'FULLY, ad. *-lĭ,* in such a manner as to raise hope; with confident expectation. HOPE'FULNESS, n. the state or quality of being hopeful; a likelihood of success. HOPE'LESS, a. without hope; being without pleasing expectation; despairing. HOPE'LESSLY, ad. *-lĭ.* HOPE'LESSNESS, n. *-nĕs,* the state of being hopeless or in despair. HO'PINGLY, ad. *-lĭ,* with hope. FORLORN-HOPE—which see.—SYN. of 'hope, n.': expectation; confidence; assurance; desire.

HOPE, *hōp,* ALEXANDER JAMES BERESFORD BERESFORD, D.C.L., LL.D.: 1820, Jan. 25—1887, Oct. 20; b. London, England: statesman. He was educated at Harrow School and Trinity College, Cambridge; member of parliament for Maidstone 1841-52, 1857-59, for Stoke-upon-Trent 1865, and for Cambridge Univ. 1868 till his death, pres. of the Royal Institute of British Architects 1855-67; and author of numerous papers and articles on religion, ecclesiastical architecture and politics; also of the novels *Strictly Tied Up* (1880) and *The Brandreths* (1882). During the American civil war he was chairman of the Southern Independence Assoc., liberally aided the Confederacy, and presented Foley's statue of 'Stonewall' Jackson to the state of Va. 1875.

HOPE, THOMAS: distinguished author and patron of art, ancient and modern: abt. 1770-1831, Feb. 3; b. London. While still a youth, he travelled over a large portion of Europe, Asia, and Africa, and collected many drawings, chiefly of buildings and sculptures. In England, he attracted attention first by the splendid decorations which he bestowed on the interior of his mansion in Duchess Street, Portland Place, London, a description of which appeared in his book *Household Furniture* 1805, a work that completely revolutionized the taste of Britain. In 1809, he published *Costume of the Ancients,* the influence of which was great. His essay on the *Architecture of Theatres,* 1809, also deserves mention. Three years afterward appeared *Modern Costumes,* and 1819, *Anastasius, or Memoirs of a Modern Greek at the Close of the 18th Century*—his masterpiece. It was published anonymously, and was said by many people to be a production of Lord Byron's, who was greatly flattered by the rumor. It is certainly a striking and erudite per-

formance, though tedious and obscure in many places. It lacks the dramatic *vis* of a genuine work of genius, and is now little read. Other works of Hope are his essay *On the Origin and Prospects of Man*, heterodox but eloquent piece of speculation; and *Historical Essay on Architecture;* both published posthumously.

HOPE AND COMPANY: firm of bankers established in Amsterdam, Holland, by Henry Hope, Scotchman, in the 17th c., and since allied by marriage and blood with several of the most aristocratic families of Great Britain; also connected with the great Barings house by marriage and business relations. The Hopes and Barings negotiated the great loan with France after the withdrawal of the allied armies, and the former have had large financial relations with Holland and Russia, being at one time a creditor of Russia to the extent of $25,000,000. The last representative of the Hope family in the firm was Adrian Elias Hope, born 1845, April 8.

HOPE'DALE, the name of a community founded by Rev. Adin Ballou, in 1841, at Milford, in Worcester co., Mass. At the beginning there were 28 persons who wished to lead lives in accordance with high ideals of Christianity. They formed themselves into a joint-stock company, purchased a farm of 238 acres, established a settlement, and proceeded to cultivate the soil, and to manufacture their own breadstuffs and clothing. In 1854 there were 200 members; but the community had become a financial failure and dissensions had crept in. In 1856 they were in debt, and as a joint-stock company they disbanded; but continued as a semi-communistic community until about 1862, when they gave up the industries they had established to private individuals, and formed themselves into Hopedale Parish with their founder as pastor.

HOP FLEA (*Haltica concinna*): very small coleopterous insect, not quite one-tenth of an inch in length, which often does much mischief in hop-plantations in spring, devouring the tender tops of the young shoots. It is of the same genus with the turnip-flea (sometimes called turnip fly), so destructive to turnips.

HOP FLY (*Aphis humuli*): destructive insect which attaches itself to the under side of the leaves of the hop plant and feeds upon its juices. It has been known in England about a century, and made its first appearance in N. Y. hop yards 1863. In some seasons it has destroyed the crop over large areas. The hop-fly was supposed to hibernate upon the roots, and various ineffectual applications to the soil were made to exterminate it. Recently it has been discovered that the eggs are laid upon the twigs of plum trees, whence the insects migrate to the hop plants. Their multiplication may be largely prevented by spraying with kerosene emulsion early in the spring all plum trees near hop yards, and by burning the vines as soon as the hops are harvested. Infested vines

are to be thoroughly sprayed with the emulsion as soon as the insects appear. Immense numbers of the insects are destroyed by natural enemies, and some seasons they are kept in check thereby.

HOP FROTH-FLY, or HOP FROG-FLY (*Amblycephalus interruptus*): species of Froth-fly (q.v.) which sometimes appears in great numbers in hop-grounds, and does considerable mischief. The perfect insect is about a quarter of an inch long, of yellow color, variegated with black. It frequents hedges and grassy places as well as hop-plantations.

HÔPITAL', MICHEL DE L'. See L'HÔPITAL.

HOP'JACK: A term applied to a vat with a false bottom used in brewing. It is so arranged that it retains the solid substances in the mash-tubs, but allows the wort to flow away after it has been boiled and the hops have been added.

HOPKINS, *hŏp'kĭnz*, EDWARD: 1600-1657, Mar.; b. Shrewsbury, England; statesman. He engaged in mercantile business in London, removed to Boston 1637, soon afterward settled in Hartford, was gov. of Conn. every even year 1640-54, aided in establishing the union of the New England colonies 1643, returned to London, and became commissioner of the admiralty and member of parliament. He bequeathed a large part of his estate to Hartford, New Haven, Hadley, and Cambridge for educational purposes.

HOP'KINS, ESEK: 1718-1802, Feb. 26; b. Scituate, R. I.: naval officer. He was commissioned brig. gen. in the army early in the revolutionary war, and appointed by congress the first commander-in-chief of the American navy 1775, Dec. He organized a fleet of 4 ships and 3 sloops 1776, Feb., captured a number of forts on the Bahamas, and two British vessels off Block Island; was charged with inactivity on the s. coast and acquitted by the naval committee 1776, June; began organizing another fleet, again had charges preferred against him, and failing to answer the summons for trial was dismissed from the service 1777, Jan. 2.

HOPKINS, HENRY: an American clergyman; b. in Williamstown, Mass., 1837, Nov. 30; was graduated at Williams College, 1858; commissioned a chaplain in the Union army in the civil war; served in the hospital of Alexandria, Va., till 1864; afterward held pastorates in Massachusetts and Missouri; then engaged in missionary and charity work; and became president of Williams College (Mass.) in 1902. He has published several sermons and addresses.

HOPKINS, JOHN CASTELL: Canadian author and journalist; b. Dyersville, Iowa, 1864. He was educated at Bowmenville, Ont. For several years was associate editor of Toronto *Empire* and resigned in 1893 to devote himself to literary work; was an early advocate on Im-

perialism in Canada, founder of the first branch of the Imperial Federation League in Ontario; member of the Council of the British Empire League. He has contributed to many magazines, etc., in Canada, Great Britain and the United States. His works include: *Imperial Federation* (1890); *A Study of British Connection* (1891); *Toronto: An Historical Sketch* (1893); *Life and Work of Sir John Thompson* (1895); *Life and Work of Mr. Gladstone* (1895); *The Sword of Islam: Or Annals of Turkish Power* (1896); *Queen Victoria: Her Life and Reign* (1896); *The Story of the Dominion* (1899); *Historical Sketch of Canadian Literature and Journalism* (1899); *History of South Africa* (1900); (Edited) *Canada: An Encyclopedia of the Country* (6 Vols., 1898-1901); *The Progress of Canada in the 19th Century* (1901); *The Canadian Annual Review of Public Affairs* (6 Vols., 1901-6); *Chronology of Canadian Events Since 1867* (1905).

HOP'KINS, JOHN HENRY, D.D., D.C.L., LLD.: 1792, Jan. 30—1868, Jan. 9; b. Dublin: Prot. Episc. bishop. He came to America with his parents 1800, assisted Alexander Wilson in illustrating his *Ornithology,* engaged in the iron business in w. Penn., was admitted to the bar at Pittsburg 1818, practiced successfully till 1823, when (Dec. 24) he was ordained deacon in the Prot. Episc. church. The same year he became priest, and 1824 rector of Trinity Church, Pittsburg, of whose new building he was also architect. Failing to gain his bishop's consent to found a seminary at Pittsburg, he resigned and became asst. rector of Trinity Church, Boston, 1831. The next year he was consecrated the first Prot. Episc. bishop of Vermont.

HOP'KINS, JOHNS: 1795, May 19—1873, Dec. 24; b. Anne Arundel co., Md.: philanthropist. He was of Quaker parentage and education, carried on the wholesale grocery business in Baltimore 1822-47, and afterward was engaged in banking and real estate and railroad operations. He acquired large wealth, out of which he endowed the Johns Hopkins Univ. on his Clifton estate near Baltimore with $3,500,000 (opened 1876) and the Johns Hopkins Hospital, free to all, with $4,500,000 (opened 1889, May), gave the city of Baltimore a public park, established an orphanage for colored children, and gave largely to other benevolent purposes.

HOP'KINS, MARK, M.D., D.D., LL.D.: 1802, Feb. 4—1887, June 17; b. Stockbridge, Mass.: educator. He graduated at Williams College 1824, and at the Berkshire Medical School 1829, practiced a few months in New York, was elected prof. of moral philosophy and rhetoric at Williams College 1830, was licensed to preach 1832, succeeded Rev. Dr. Edward D. Griffin as president, and assumed the newly-created chair of moral and intellectual philosophy 1836, took also the chair of Christian theol.

1858, resigned the office of pres. but retained his professorships and pastorate 1872, and resigned the latter 1883. He was pres. of the A. B. C. F. M. from 1857 till his death. His publications include *Mystery* in the *American Journal of Science and Art* (1828); *Lectures on the Evidences of Christianity,* Lowell lecture course (1846, 64); *Miscellaneous Essays and Discourses* (1847); *Lectures on Moral Science* (1862); *Baccalaureate Sermons and Occasional Discourses* (1863); *The Law of Love, and Love as a Law; or, Christian Ethics* (1869); *An Outline Study of Man* (1873); *Strength and Beauty* (1874), reissued as *Teachings and Counsels* (1884); and *Scriptural Idea of Man* (1883). He received the degree D.D. from Dartmouth College 1837, and Harvard College 1841; and LL.D. from the Univ. of the State of New York 1857, and Harvard Univ. 1886.

Dr. Hopkins was one of the most distinguished educators of his time. As a college administrator he was unsurpassed. To great learning and profound thought he added a practical wisdom, a marvellous judgment of men, and an unusual symmetry of character. His deep moral nature and strong religious feeling were developed in beneficent influence over his students, many of whom in after years deemed their personal association with him one of the chief elements in their education.

HOP'KINS, SAMUEL, D.D.: 1721, Sep. 17—1803, Dec. 20; b. Waterbury, Conn.: theologian, from whom the special system of Calvinism known as Hopkinsianism is named. Having graduated at Yale College 1741, he studied theology with Jonathan Edwards, and 1743-69 was Congl. pastor at Housatonic, now Great Barrington, Mass. He then removed to Newport, R. I., where he was pastor of a small Congl. church 1770—abt. 1800, and where he died. His writings consist of a life of Pres. Edwards, sermons, addresses, a work on the millennium, and *System of Theology,* republished, 3 vols., Boston 1852. He is said to be the hero of Mrs. Beecher Stowe's *Minister's Wooing.* He was remarkable for his simplicity, earnestness, and persevering industry, and his peculiar theological doctrines were a source of controversy for a century. Dr. Hopkins had an acute intellect, and a high ethical and spiritual tone of thought. He is to be held in honor as among the first in America to attack slavery on the ground of Christian morality, and to organize political action against it.

HOPKINSIANISM, *hŏp-kĭn'sĭ-an-ĭzm,* has been summed up as follows: (1) God is the efficient cause of all the heart's volitions, good or evil. (2) The guilt of Adam's first sin is on Adam alone, and is not imputed to his descendants, whose moral corruption consists in their aversion to that goodness of which they are fully capable. (3) All holiness consists in disinterested benevolence. (4) All sin consists in selfishness. (5) Reconciliation and redemption are distinct works of God for sinful men;

reconciliation opens the way of grace through Christ; redemption applies to individuals the saving grace that is in Christ. (6) Effectual calling to salvation consists in the willingness to be saved by God's grace in Christ: it is induced in the sinner's heart by God. (7) The righteousness of Christ is the only ground of the sinner's justification, yet it is not, in any strict or proper sense, imputed to the sinner. (8) Repentance precedes in time the act of faith in Christ. A point in this system which drew popular notice was, the duty of loving God irrespective of the eternal reward of heaven secured thereby. This, and other points, have been distorted even to caricature by theological opponents. The system doubtless exerted a modifying force on theology; but as a whole, it is now merely a flood-mark of past controversy.

HOP'KINS, STEPHEN, LL.D.: 1707, Mar. 7—1785, July 19; b. Scituate, R. I.: signer of the Declaration of Independence. He was of Quaker parentage, was bred a farmer, inherited a large estate; removed to Providence 1731, was elected member of the assembly 1732, and annually re-elected till 1738, resumed his seat and became speaker 1741, appointed justice of the court of common pleas 1736, and its chief justice 1739, chief justice of the superior court 1751-54, gov. with a single interruption 1754-68, member of congress 1774-78, and chancellor of R. I. College (now Brown Univ.) several years.

HOPKINSON, *hŏp'kĭn-son,* FRANCIS: 1737, Sep. 21—1791, May 9; b. Philadelphia: signer of the Declaration of Independence. He graduated at the College of Philadelphia 1763, was admitted to the bar 1765, became collector of customs at Newcastle 1772, settled in Bordentown, N. J., was a member of the N. J. provincial council 1774-5, of congress 1776-7, served on the committee that drafted the articles of confederation, and under the new constitution was the first head of the navy department. He was U. S. judge of admiralty for Penn. 1779-89, and U. S. dist. judge for Penn. 1790 till death. Hopkinson was a painter, musician, musical composer, scientist, poet, and author—his best known work being the humorous poem *The Battle of the Kegs* (1778). His son JOSEPH HOPKINSON, 1770, Nov. 12—1842, Jan. 15, b. Philadelphia, and graduated at the Univ. of Penn. 1786, was eminent as a lawyer, U. S. judge for the e. dist. of Penn. 1828 till death, pres. of the Acad. of Fine Arts, vice-pres. of the American Philosophical Soc., and author of the national hymn *Hail Columbia!*

HOPKINSVILLE, *hŏp'kĭnz-vĭl:* city, cap. of Christian co., Ky.; on Little river and the Louisville and Nashville railroad; 71 m. n.w. of Nashville. It is the seat of S. Ky. College and of the state insane asylum, is regularly laid out and well built, and contains an acad., seminaries, several churches, national and state banks, botanical garden, public library, city hall, flour and planing-mills,

coach and plow factories, and two newspapers. It is in a rich agricultural, coal, and iron region. Pop. (1900) 7,280; (1910) 9,419.

HOPKINTON, *hŏp'kĭn-ton:* town (inc. 1715), Middlesex co., Mass.; on the H. Milford and Woonsocket railroad; 15 m. e.s.e. of Worcester, 30 m. w.s.w. of Boston. It has several churches, national and savings banks, a large boot and shoe factory and a newspaper. Pop. (1910) 2,452.

HOPLITE, n. *hŏp'līt* [Gr. *hŏplītēs*—from *hoplon,* a weapon]: a heavy armed soldier of anc. Greece.

HOPLOPHOR'IDÆ. See GLYPTODON; ARMADILLO.

HOPPER, n. *hŏp'pĕr* [from *hop,* to take short leaps: Dut. *haperen,* to stammer, to stutter]: the funnel or trough through which grain passes into a mill to be ground—so called from the jumping, shaking motion that is given to it; a vessel in which seed-corn is carried; a conical vessel suspended from the ceiling, containing sand and water, for the use of the cutter in glass.

HOPPER, DE WOLF: American actor; b. New York 1858. He made his first professional appearance in *Our Boys* (1878), and later appeared in *Hazel Kirke,* and other plays. He studied vocal music for several years and became a star in comic opera and musical comedy.

HOPPER, *hŏp'ĕr,* ISAAC TATEM: 1771, Dec. 3—1852, May 7; b. Deptford, Gloucester co., N. J.: philanthropist. He removed to Philadelphia when a boy, learned the tailor's trade with an uncle, joined the Soc. of Friends, and through his early and active membership in the Penn. Abolition Soc. soon became widely known as a staunch friend of the colored race. The zeal and success with which he fought the men that came to Philadelphia and vicinity intent on kidnapping free negroes and runaway slaves, added greatly to his fame among the early abolitionists at the north and the slaves in the south; while his singular devotion to the sick and poor during the yellow-fever epidemic 1793 gave him general popularity at home. The large measure of confidence that he inspired among all classes in Philadelphia was attested by the facts that he became overseer or supt. of a school founded by Anthony Benezet for colored youth, founder and sec. of an assoc. for securing employment for the poor, inspector of the penitentiary, arbitrar between oppressive landlords and their tenants, friend and guardian of ill-treated apprentices, equity advisor to all sorts of people in trouble, and a particularly skilful worker among the insane. Though a poor man he would never accept pay for his humane works, and though his family was large his home almost constantly sheltered Friends in distress. No form of suffering or affliction was too humble or dangerous for his prompt attention; no reform too great for him to undertake; no risk for human relief too threatening for him to assume. Previous to

the division in the Soc. of Friends (1827-8) he had affiliated with the extreme orthodox members; but his strong anti-slavery convictions led him to an admiration of Elias Hicks (q.v.), and when the rupture was completed he gave his adhesion to the branch known as Hicksites. In this new assoc. he was induced to remove to New York and take charge of a book-store opened by the Hicksite Friends 1829, and after a brief visit to England and Ireland he began in New York the great work of his life —that in connection with the Prison Assoc., while relaxing none of his energy in behalf of fugitive slaves. He was an early co-laborer in William Lloyd Garrison's anti-slavery movement, begun 1831, and for 15 years he lived in constant risk—yet fearless—of his life, was the subject of frequent legal persecution, and was denounced in private and public and often by the Friends themselves. In 1841 he was appointed treas. and book-agent of the Anti-Slavery Soc., and 1845 resigned these offices to apply himself wholly to the work of the Prison Association. He secured the act of incorporation for the assoc., and as its agent made himself the friend, advisor, and benefactor of convicts, visiting them in prison, looking after their families during the terms of their incarceration, obtaining pardons in deserving cases, and seeking homes and employment for them after their discharge. Gov. John Young once told him that he would cheerfully pardon any convict whom he (H.) conscientiously believed should be pardoned. While he thus labored for male convicts, one of his daughters, Abby H. Gibbons, co-operated with him till impelled to apply her energies to the similar unfortunates of her own sex; and through her exertions 'The Isaac T. Hopper Home for Discharged Convicts' was erected in New York and placed under her superintendence.

HOPPIN, *hŏp'ĭn*, AUGUSTUS: artist and author: b. Providence, R. I., 1828, July 13; d. 1896, Apr. 1. He graduated at Brown Univ. 1848, practiced law in Providence, studied art in Europe, 1854-5, and became a draughtsman on wood for book illustrations. He illustrated *The Potiphar Papers* (1853), *Nothing to Wear* (1857), *Mrs. Partington's Sayings*, and *The Autocrat at the Breakfast Table;* and published *Carrot Pomade* (1864), *On the Nile* and *Ups and Downs on Land and Water* (1871), *Crossing the Atlantic* and *Jubilee Days* (1872), *Hay Fever* (1873), *A Fashionable Sufferer* (1883), and *Two Compton Boys* (1885).

HOP'PIN, JAMES MASON: American scholar and author; b. Providence, R. I., 1820, Jan. 17. He was graduated from Yale in 1840, studied law at the Harvard law school (1841-2), theology at the Union and Andover seminaries (1843-5) and the University of Berlin (1847-9), was ordained to the Congregational ministry in 1850, and was pastor at Salem, Mass., in 1850-9. In 1861-79 he was professor of homiletics at Yale, in 1861-3 also pastor

of the College church, and from 1879 until his retirement as professor emeritus in 1899 professor of the history of art. His publications include *Notes of a Theological Student* (1854); *Old England: Its Art, Scenery, and People* (1867); *The Office, and Work of the Christian Ministry* (1869); *Homiletics* (1881); *Pastoral Theology* (1889); *The Early Renaissance* (1892); and *Greek Art on Greek Soil* (1897).

HOPPLE, v. *hŏp'l* [Dut. *hobbelen*, to jolt, to stammer; Scot. *hobbil*, to mend shoes in a bungling manner]: to tie the feet near together to prevent leaping. HOPPLING, imp. *hŏp'lĭng*. HOPPLED, pp. *hŏp'ld*. HOPPLES, n. plu. *hŏp'lz*, fetters for the legs of horses.

HOPPO, n. *hŏp'pō* [Chinese]: in *China*, an overseer of commerce; a collector; a tribunal appointed to collect the public revenue arising from trade and navigation.

HOPPS, JOHN PAGE: English Unitarian clergyman; b. London, 1834, Nov. 6. He was educated at the Baptist College in Leicester, and first entered the Baptist ministry. Becoming a Unitarian, he held pastorates in Unitarian churches in Sheffield, Dukinfield, Glasgow, Leicester, and Croydon. He was a member of the first school board of the city of Glasgow. He was proprietor and editor of *The Truthseeker*, 1863-87, and became editor of *The Coming Day* in 1891; he has written *Pilgrim Songs; A Scientific Basis of Belief in a Future Life; The Alleged Prophecies Concerning Jesus Christ in the Old Testament; The Plain Truth About the Bible; First Principles of Religion and Morality.*

HOPS. See HOP.

HOP-SCOTCH. See under HOP.

HOP-TREE [bot. *ptelea*, elm; *trifoliata*, three-leaved], known also as SHRUBBY TREFOIL, or WINGSPEED, or WAFER ASH: American shrub of the family *Rutaceæ* (rue), found from Penn. to Wis. and in the south; usually 6 to 10 ft. high, but under thorough cultivation from 30 to 40 ft. The leaves are in clusters of three, pointed, and with a downy surface when young; the flowers appear at the ends of new shoots, small and greenish; and the fruit has two cells, each containing a seed, surrounded by a broad wing. The Hop-tree has a neat appearance as an ornamental growth, but is backward in the spring. Its fruit is substituted for the true hop by beer brewers, and its leaves and tender shoots made into an infusion are used as a remedy for worms in children.

HOR, *hawr*, MOUNT [Arab. *Jebel Neby Harun*]: twin-peaked mountain in Arabia Petræa, belonging to the Jurassic chain of Shera, Seir, or Edom; on the e. edge of the valley of the Arabah, 4,800 ft. above the sea. It was the scene of the death of Aaron the high priest, and his tomb, a square Saracenic structure, is shown on one of the summits. This locality is referred to in Numb. xx. 23, xxxiii. 37, and was the first resting-place of the Is-

raelites after they left Kadesh. See Numb. xxxiv. 7, 8, for another summit of the same name.

HORACE (QUINTUS HORATIUS FLACCUS) was recognized in his own time as one of the greatest poets of Rome. Throughout the period of the Middle Ages and of the Renaissance he maintained his supremacy and he has united all the cultivated nations of modern times in a common admiration for his genius. Men as diverse in sentiment as Ben Jonson, Addison, Wordsworth, and Byron in England, and Fénelon and Condorcet in France, and Schopenhauer and Bismarck in Germany, are on intimate terms with him.

Horace was born B.C. 65 in the colony of Venusia in southern Italy. Here he passed his early years and imbibed that love of nature which he never lost, even amidst the busy life of Rome. The most important influence on his early life was that exercised by his father. No writer of ancient times shows an equally genuine and deep filial affection. He always refers to his father with great tenderness and attributes to his wise care whatever merits he may possess. The perfect candor with which he acknowledges his debt of gratitude to his father, who was a freedman, one whose social position was little better than that of a slave, was greatly to the poet's credit. To his father he was indebted for the most complete education which the times could afford. After spending his early years in the best school of his native town, his father took him to Rome and placed him in the care of Orbilius, one of the most famous teachers of his time. He even went to the expense of sending his son, when 18 years of age, to study in Athens. While here the civil war broke out; Horace joined the Republican forces under Brutus, and was given the command of a legion. After the battle of Philippi he returned to Rome, but his return was a sad one. His father had died and his humble paternal estate had been confiscated. The high hopes and ambition, which as the commander of a legion he had cherished, were lost and, as he tells us, he was brought low with clipped wings. At Rome he obtained the humble position of clerk of a quæstor. The recklessness of poverty, he says, gave him courage to write verses. He won public attention by satirizing the minions of Octavianus, the future emperor. Mæcenas, who was the chief counselor of state, recognized the genius of the young poet, and desired Virgil to bring him to join the literary circle at his palace. During the rest of his life, he died B.C. 8, Horace lived on intimate terms of friendship with this most powerful of the Romans without the sacrifice either of his dignity or his independence. The Sabine farm, the praises of which are ever on our poet's lips, was the gift of Mæcenas. This estate made the poet independent and enabled him to devote his time to literary pursuits. The friendship of Mæcenas brought Horace into the company of Augustus, and of the other great men

of Rome. In his poems he shows his appreciation for all the honors and favors bestowed on him, but he is never, like too many of the later poets of Rome, servile in his bearing towards the great.

One of the special charms of Roman literature is the prominence of the personality of the writer. The lives of many of the Latin authors lie before us like an open book. After reading Horace we feel on intimate terms with him. We become acquainted with his character and the inmost sentiments of his heart, and even with his personal appearance. There are a large number of fine odes addressed to his many friends. These bring vividly before us his social graces and the sincerity of his devotion. It is especially pleasing to see with what openness of heart and glow of feeling he expresses his admiration and love for Virgil, of whom he said that there never was a more spotless soul than his, never a dearer friend. Horace has a high ideal of friendship and he regards it as one of the noblest sources of joy in life.

Horace's so-called love-poems display but little real feeling, and they do not appeal to us as do the impassioned love poems of a Catullus or a Propertius.

The most characteristic poems of Horace are those in which he sets forth his philosophy of life. He adopted the teachings of Greek philosophy, and these he transfused with Roman practical wisdom and set forth in perfect artistic form. These practical lessons are true for all time and they have been dignified with the name of Horatian philosophy. Horace excells in the power of giving to an old truth the force of a new discovery. The jewel may be old but the cutting and the setting are new. His writings are full of aphorisms and maxims which have come to be regarded as familiar quotations. The fidelity and precision with which he expresses his own feelings, and thus the feelings of others, is shown by the fact that mankind have adopted so many of his expressions as the most perfect embodiment of their own thoughts and emotions. His exquisite felicity of phrase and elaborate delicacy of workmanship has been the admiration and despair of all ages. It is this very quality of Horace which has rendered his verse the despair of all translators, though almost all the greater and lesser bards of modern times have tried their hand at this futile task. Horace's works consist of lyrical poems called *Odes* and *Epodes, Satires* and *Epistles.* His fame rests chiefly on his *Odes.* These are written in various metres derived from the Greek. His *Satires,* which he called *Sermones, Conversations,* have not the bitterness and severity of Juvenal's *Satires* but display rather a genial, kindly spirit. With his precepts he combines a sympathy for the frailties of human nature. The *Epistles* reveal more fully the inner life of the poet at a time when his philosophy of life and artistic development have reached their full development.

We would not claim for Horace a place among the greatest poets of the ages but his muse has nevertheless subserved the true ends of poetry. He was not carried away by the splendors and magnificence of a materialistic age. He teaches unworldliness, self-restraint, and moderation. It is the spiritual world that he strives to hold ever before the eyes of the too practical Romans.

HORAL, a. *hōr'ăl* [L. *hora*, an hour]: relating to an hour of hours. HOR'ALLY, ad. *-lĭ*. HORARY, a. *hōr'ă-rĭ*, relating to or denoting the hours; in *bot.*, lasting about an hour.

HORATII, *hō-rā'shĭ-ĭ:* three Roman brothers born at the same birth who became champions of Rome in the war against Alba Longa and personally fought the Curiatii, three Alban brothers also born at one birth. The legend is that the mothers of the boys were twin sisters and gave birth to them the same day and hour. The encounter occurred about B.C. 667, on a plain between the camps of the Roman and Alban armies, a few miles from Rome. The two kings had agreed that the issue between them should be settled by the personal combat of the brothers of the two families. In the first encounter two of the Horatii were killed and all the Curiatii wounded. The surviving Horatius then pretended flight, and when the Curiatii became separated in the attempt to cut off his escape in various directions, he turned suddenly and slew them one by one. Returning to Rome with the mantle of one of the Curiatii, Horatius was reproached by his sister for having killed her betrothed, whereupon he killed her. For this he was condemned to death, but the people spared his life on his passing beneath the yoke. Subsequently he was sent to destroy Alba Longa and transport all its inhabitants to Rome.

HORDE, n. *hōrd* [F. and Ger. *horde*, a horde, a clan: Alb. *hordi;* Turk. *ordú*, a camp, a tribe]: a body of wandering or migratory people dwelling in tents or wagons: v. to live together like migratory tribes. HORD'ING, imp. HORD'ED, pp.

HÖRDE, *hōr'dė:* growing town of Westphalia, 33 m. s. of Münster. Near it are coal-mines. Nail-making is carried on. Pop. 12,458.

HORDEIN, or HORDEINE, n. *hŏr'dē-ĭn* [L. *hordĕŭm*, barley]: peculiar substance that can be extracted from barley, but which is merely a mixture of starch, cellulose, and a little nitrogenous matter of unknown composition.

HORDEOLUM, n. *hŏr-dē'ŏ-lŭm* [a dim. of L. *hordĕŭm*, barley]: a small, hard, painful boil developed in the margin of the eyelid, so called from its likeness in size and hardness to a small barley-corn; the style.

HOR'DEUM. See BARLEY.

HORDEUM DECORTICATUM, *hawr'dē-ŭm dē-kawr-tĭ-kā'tŭm:* in *phar.*, pearl barley; the husked seeds of

Hordeum distichum. It is used prepare decoction of barley, made by washing two ounces of barley with cold water, and pouring 30 ounces of boiling water over it, for a mild nutritive and demulcent drink.

HO'REB, MOUNT. See SINAI.

HOREHOUND, or HOARHOUND, n. *hōr'hownd* [AS. *harahune,* horehound—from *har,* hoary, gray; *hune,* consumption. It is also said that *hound,* from *hune,* means 'strong-scented'], (*Marrubium*): genus of plants of nat. ord. *Labiatæ,* having a tubular 10-ribbed calyx, with 5 or 10 spiny equal teeth, 4 stamens, included in the corolla, the upper lip of the corolla erect, the lower lip 3-cleft. The species are mostly perennial, herbaceous plants, natives of s. Europe and the East. One species, the COMMON or WHITE HOREHOUND (*M. vulgare*), is found generally throughout Europe, except in the more northern regions, growing in waste places, waysides, etc. It is about 1—1½ ft. high, bushy, with roundish, ovate, crenate, wrinkled leaves, and almost globose whorls of white flowers. The whole plant has a whitish appearance, from the down with which its leaves are covered. It has an aromatic but not very agreeable smell. It is tonic, stimulant, and laxative, and is much used in coughs, being a popular remedy, safe and efficacious. It was formerly used also in affections of the womb and of the liver. It is administered in the form of an infusion, or made into a syrup with sugar, and sometimes the syrup is candied. The name Horehound belongs also to another plant, of closely allied genus, *Ballota nigra,* sometimes called Black Horehound, a fetid plant, also of the order *Labiatæ.* It has a more disagreeable odor, but nearly resembles the White Horehound in taste, and has similar medicinal properties. A third plant, *Lycopus Europæus,* a diandrous plant of the same nat. ord., sometimes called WATER HOREHOUND, is known also as Gypsy-wort.

HOR'ICON, LAKE. See GEORGE LAKE.

HORICON LAKE, *hŏr'ĭ-kon:* in Wis.; extends from the n. part of Dodge co. to the s. part of Fond du Lac co.; 15 m. long, 5 m. wide; outlet, Rock river, at the s. end. It is a shallow, grassy basin, known formerly as Winnebago marsh.

HORIZON, n. *hŏ-rī'zŭn* [Gr. *horīzōn,* that which terminates—from *horos,* a boundary]: the circular line where the earth and sky seem to meet, called the *sensible horizon;* the great circle dividing the visible and invisible heavens into two equal parts is called the *rational horizon:* it is the circle formed by a plane passing through the centre of the earth, parallel to the sensible horizon, and produced to meet the heavens. HORIZONTAL, a. *hŏr'ĭ-zŏn'tăl,* on a level; on a line with the horizon; the opposite of *perpendicular* or *vertical.* HOR'IZON'TALLY, ad. *-lĭ.* HOR'IZONTAL'ITY, n. *-ĭ-tĭ,* state of being horizontal. ARTIFICIAL HORIZON, a reflector whose surface is perfect-

ly horizontal, used to observe altitudes. HORIZON-GLASS, a glass fixed in front of the telescope of a reflecting astronomical instrument, whose lower part is a mirror, the upper being transparent.

HORIZONTAL BOILER: one in which the longitudinal axis of the barrel is horizontal, such as the Cornish, Galloway, and Lancashire boilers, and various forms of marine boilers.

HORIZONTAL ENGINE: one in which the axis of the cylinder and piston rod is horizontal.

HORMUZD. See ORMUZD.

HORN, n. *hŏrn* [Goth. *haurn;* Icel. *horn;* Dut. *horen;* L. *cornu;* Bret. and W. *corn,* a horn]: hard substances projecting from the heads of certain animals (see HORNS); wind musical instr. originally made of a horn; a drinking-cup; the two ends of the waning or waxing moon; in *Scrip.*, a symbol of power; the feelers of certain insects. HORNY, a. *hŏr'nĭ,* made of horn; hard; callous. HORNLESS, a. *hŏrn'lĕs,* without horns. HORNED, a. *hŏrnd,* having horns; crescent-shaped. HORNEDLY, ad. *hŏrn'ĕd-lĭ.* HORN'EDNESS, n. *-nĕs.* HORNER, n. *hŏr'nĕr,* one who works in horn. HORNING, n. the appearance of the crescent moon; in *Scots law,* a certain process to compel a party to execute a judgment or decree of the court. HORNBEAK, n. *-bēk,* a bird. HORNBEAM, a tree and its wood, which is very hard and heavy. HORNBUG, n. a kind of beetle. HORNFISH, n. the gar-fish or sea-needle. HORN-MAD, in *OE.*, a supposed corruption of *harn-mad*—that is, brain-mad. HORNPOCK in *pathol.*, an old name for a mild variety of small-pox, in which the eruption, never confluent, consists of pustules, hard to the touch, called seedy or horny; called also stone-pock. HORNSTONE, n. a variety of quartz resembling flint, but more brittle, used for snuff-boxes, handles of knives and forks, etc.; chert. HORNSLATE, n. a mineral. HORNBLENDE, n. *-blĕnd* [Ger. *blende,* that which blinds—from *blenden,* to dazzle]: a mineral so called from its hornlike cleavage and peculiar lustre; or so named from *blind* because it contains no ore; a rock-forming mineral allied to augite (q.v.), and containing 40 to 60 per cent. of silica, with variable quantities of alumina, lime, oxide of iron, soda, potash, and fluorine. It is found in granite, syenite, and other igneous rocks which contain quartz or free silica, and is abundant particularly as a constituent of syenite. It is found sometimes in considerable masses, and even in beds of slaty structure (*Hornblende slate*). COMMON HORNBLENDE is usually green or black, more rarely brown or gray: it contains a large proportion of protoxide of iron; is usually massive, but sometimes crystallizes in oblique four-sided, or in six-sided prisms. The crystallized hornblende is sometimes called *Black Schorl,* and is capable of being made into ornaments. HORNBLEN'DIC, a. *-blĕn'dĭk,* composed chiefly of hornblende; pertaining

to. HORN'PIPE, n. musical instrument, which consisted of the common wooden pipe with the holes for producing the notes, and with a horn on each end. The performer blew into one of the horns, and the sounds of the pipe proceeded out of the other. In the n.w. of England, where mostly this instrument was found, it was used to accompany a national dance also called the Hornpipe, still a favorite, especially among sailors. The melody of this dance is always in triple time—that is, in $\frac{3}{2}$, or $\frac{3}{4}$, and sometimes in $\frac{3}{8}$ time—and it consists of two parts of four or eight bars each, with repeats. The movement of the dance is lively. HORN-SILVER, the native chloride of silver (see SILVER). HORNED-HOG, the baby roussa (q.v.). HORNED-HORSE, the gnu (q.v.). TO DRAW IN THE HORNS, to withdraw from any position or attitude of assertion. TO PUT TO THE HORN, in *Scots law,* to denounce as a rebel, an outlaw, or a fugitive from justice—so called from the ancient formality of blowing a horn; to charge to pay a debt, or perform an act under a decree. TO WEAR THE HORNS, said of a man whose wife is unfaithful to him; a submissive cuckold. HORN OF PLENTY, the CORNUCOPIA, which see. HORNS OF A DILEMMA (see DILEMMA): a phrase taken from logical parlance; a difficulty of such a kind that, in whichever way met, the result is disagreeable; a strait between the choice of two evils, or two disagreeable things.

HORN, sometimes FRENCH HORN: musical instrument, developed out of the hunting-horn (hence the French name *Cor de Chasse;* Italian *Corno de caccia;* German *Waldhorn*). Its form is now that of a long tube of brass, with a large bell-shaped ending. For greater convenience the tube is coiled in a circle, with an oblong piece in the middle called the tuning slide, to adjust the pitch to that of other instruments. It is sounded by means of a mouthpiece, in form like a little hollow cup. The thinner the sheet-brass is of which the horn is made, the more easily can the sound be produced. The sounds obtained on the horn are the harmonics of the sound of its whole length, a fundamental sound which cannot be produced by the mouth. As those sounds form only a limited scale, the notes lacking are artificially made, by the hand being inserted into the bell, so as to flatten a higher note down to a lower one. These flattened notes are called stuffed notes, as the sound of them is muffled. The horn, in its natural state, can be played only in one key; but by means of crooks, from A in alt down to C, it can be transposed into any key between and including those. When at its greatest length, the horn measures, from the mouth-piece to the end of the bell, 16 ft. The music is always written in the key of C, with the key of the composition marked at the beginning of each movement; thus, Corno in D, etc., guides the performer as to the crooks he must use, in order to play the notes in the key indicated. The stuffed notes being very defective in

quality of sound, in comparison with the great beauty of the open notes, many inventions have been, from time to time, tried to remedy them. The most successful invention is the valve-horn, constructed so that the performer can, by means of three valves, lengthen or shorten the tube, so as to produce any note in the chromatic scale, as a harmonic of the length of the tube, and consequently all of the notes are of the same quality of sound, and open notes. The valve-horn is now generally used as a solo instrument with greater effect than the common horn. As an orchestral instrument, the horn is of great importance. There are never less than two horns in an instrumental score, and in many great works four horns are absolutely necessary. The date of the invention of the horn is lost in antiquity. The *buglehorn* is a tube of 3 feet 10 inches in length bent into small compass. It is usually provided with keys, and has a range of two octaves.

HORNBEAM, n. *hŏrn'bēm* [see BEAM—so named from the character of its wood], (*Carpinus*): genus of nat. ord. *Cupuliferæ;* consisting of trees with compact tough, hard wood; bark almost smooth and of a whitish-gray color, deciduous leaves, and monœcious flowers. The male catkins are cylindrical and sessile, their flowers consist merely of a little scale-like bract and 12-24 stamens. The female flowers consist of a germen, crowned with the 4-8 toothed border of the perianth, and with two thread-like stigmas, and are placed in loose slender catkins, always two together, each at the base of a stalked bract, which is three-cleft or three-cornered, and which, when the tree is in fruit, enlarges very much, becomes leafy, and covers the fully ripened nut on one side. The nut has a thick husk, and is small and striated. The COMMON HORNBEAM (*C. Betŭlus*), very frequent in the woods of many parts of Europe, is a beautiful tree, attaining a height of 60-100 ft., and in appearance like a beech. It has elongato-ovate, acuminate, almost triply serrate leaves. When in fruit, it has very large, deeply 3-partite bracts. It thrives best in a moderately moist and shady situation. Its root descends deep into the ground. The wood is white, very hard, uncommonly strong and tough, therefore suitable for bearing heavy strains. It is much used by joiners, turners, and wheelwrights. It takes a very fine polish, and, when well stained, might readily be mistaken for ebony. In the earth, or where exposed to changes of weather, it is of no great durability. It burns like a candle, and it is one of the best kinds of firewood; it affords excellent charcoal, and the ashes yield much potash. The young stems, by reason of the dense growth of their twigs, are very suitable for forming live-fences and bowers; and as it bears clipping very well, the hornbeam was often employed to form those live-walls formerly the fashion in gardens. The American Hornbeam (the blue or water beech, or iron-wood) is *C. americana.*

HORNBILL: genus (*Buceros*), and family (*Bucerotidæ*), of birds, to which Cuvier assigned a place in the syndactylous division of the order *Insessores*, but which some naturalists rank with crows in the tribe *Conirostres*. Their anatomical structure has been found to indicate affinities both with crows and toucans, and the same inference may be drawn from their habits. The species number more that

Hornbill (*Buceros Rhinoceros*).

50; they are natives of Africa and the E. Indies. They are mostly large birds, some nearly as large as a turkey, the smallest rather smaller than a magpie. They are remarkable for enormous size of bill, and for a large bony protuberance with which the bill is generally surmounted. The bill is curved, broad at the base, compressed toward the tip; the bony protuberance on the upper mandible assumes different forms in different species. They are social birds, and have some very remarkable habits; and are so voracious that they may be described as omnivorous.

HORNBOOK: primer or apparatus for learning the elements of reading, used in England before the days of printing, and common till the time of George II. It consisted of a single leaf, containing on one side the alphabet large and small, in black-letter or in Roman, with perhaps a small regiment of monosyllables. Then followed a form of exorcism and the Lord's Prayer, and as a finale, the Roman numerals. The leaf was usually set in a frame of wood, with a slice of transparent horn for protection in front—hence the name *horn* book. There was a handle to hold it by, and usually this handle had a hole for a string, whereby the apparatus was slung to the girdle of the scholar. Sometimes the leaf was simply pasted against a slice of horn

At first, the leaf was of vellum, with the characters in writing; latterly, of paper, and printed. The H was prefaced and otherwise ornamented with figures of the cross, and hence came to be often called Christ Cross Row, or Criss Cross Row. Common as hornbooks at one time were, specimens of them are now exceedingly rare. The annexed representation is copied from one given by Halliwell, as

Hornbook — 17th Century.

taken from a black-letter H. found some years ago in pulling down an old farmhouse at Middleton, in Derbyshire, England. A portrait of King Charles I. in armor on horseback was on the reverse, affording an approximation to the date. In *Notices of Fugitive Tracts*, printed for the Percy Soc. (1849), Halliwell figures a more perfect specimen, which he assigns to the time of Elizabeth.

HORNE, *hawrn*, THOMAS HARTWELL, D.D.: 1780, Oct. 20—1862, Jan. 16; b. London: English biblical critic. He was educated at Christ's Hospital, and afterward became clerk to a barrister. His leisure hours were given the study of the Bible, and 1818 he published *Introduction to the Critical Study and Knowledge of the Holy Scriptures*, a work which procured for him admission into holy orders without the usual preliminaries. Subsequently, St. John's College, Cambridge, granted him the degree of B.D., and two American colleges that of D.D. In 1833, he obtained the rectory of St. Edmund the King and St. Nicholas Acons, London. He was also made a prebendary of St. Paul's Cathedral. Horne published a great variety of works, but the one above mentioned is the principal. From the first moment of its appearance, it not only became popular, but attained the dignity of being considered the text-book on the subject in almost all the theological colleges of Great Britain and America. It has gone through 11 or 12 editions, and has been frequently improved.

HORNED FROG, or HORNED TOAD: lizard of the genus *Phrynosoma*, not a batrachian, but a saurian, though resembling a frog or a toad. The half dozen species are N. American. The name has been given also to a S. American batrachian (genus *Ceratophrys*), on whose head spiny protuberances are developed. It is much larger than the common frog.

HORNELLSVILLE, *hawrn'ĕlz-vĭl:* city in Steuben co., N. Y., on the Canisteo river, and on the Erie and the Central New York and Western railroads; 58 m. s. of Rochester and 46 m. n.w. of Elmira. It is in a fertile agricultural region which is noted for its fruit products, and the chief manufactures are agricultural implements, sash, doors and blinds, carriages and wagons, furniture, gloves, leather, railroad supplies, silk, brick and tile, wire-fencings, etc. The city contains several public schools, a high school, churches, banks, the St. Ann's Academy, St. James Mercy Hospital, a public library of 10,000 volumes, several parks, and a number of fine public and private buildings. Hornellsville was first settled in 1795 and was a part of Canisteo, being called Upper Canisteo, till 1820, when it was incorporated as a separate town and given its present name in honor of George Hornell, who was prominent in the early development of the town. Hornellsville was incorporated as a city in 1890, under the revised charter, the government being vested in a mayor, who holds office 2 years, and a unicameral council. The council confirms the mayor's appointments of subordinate officers. Pop. (1910) 13,617.

HORNER'S METHOD, in Algebra: process for finding the values, to any desired degree of approximation, of the real roots of numerical equations. The method, which is analogous to that employed in the extraction of

square and cube root, was invented by W. G. Horner (1819). For a good account of it see any book on higher algebra or the theory of equations.

HORNET, n. *hŏr'nĕt* (Ger. *horniss*, from the buzzing noise: Dut. *hornsel*, a hornet—from *horselen*, to buzz), (*Vespa crabro*): species of large wasp (q.v.). The thorax is mostly black, the fore-part rufous; the abdomen yellow, with three brown points on each segment. The sting is very painful. The Hornet is a very voracious insect, seizing and devouring flies, bees, and other insects, or carrying them to its nest to feed its young. The nest is in a hollow tree, in an outhouse, or other sheltered place. The community is not supposed ever to contain more than about 200 individuals, all deriving their origin

Hornet (*Vespa crabro.*)

from a single female, which, having survived the winter in some sheltered hiding-place, lays the foundation of the nest in spring. The nest is a curious structure, of a substance resembling coarse paper made from decayed wood mixed with a salivary secretion and kneaded into a pulp; and, except as to size, similar to that of the common wasp. The community consists of females, males, and neuters or workers.

HORNITOS, n. *hor-nē'tos*, or HOR'NOS, n. *-nŏs* [Span. *ovens*]: low oven-shaped hillocks which emit smoke and vapors, and which are numerous on the sides and in the neighborhood of the large volcanoes of S. America.

HORNIZE, v. *hŏr-nīz'* [so named after the inventor, Mr. *Horn*]: to pave or causeway a footpath with chips or splinters of such hard rocks as greenstone, or granite. HORNIZ'ING, imp.: N. the art of paving footpaths with stone-chips. HORNIZED, pp. *hŏr-nīzd'*.

HORN MANUFACTURES: making of useful and ornamental articles from the horns of various animals; principally those of the ox, buffalo, and two or three species of deer, and of sheep and goats. Horn can be softened and split into thin laminæ, or pressed into molds; and as, when cold, it recovers its peculiar character of flexibility, tough-

ness, and transparency, it is particularly adapted for a great variety of purposes. It can also be dyed various colors. Solution of gold in aqua regia, dyes it red; solution of nitrate of silver in nitric acid, black; a paste of red-lead made with a solution of potash, colors it brown; so that, with a proper arrangement and application of these materials, the most admirable imitations of the much more costly tortoise-shell can be produced. The more common vegetable dye-stuffs as logwood, Brazil-wood, barwood, saffron, indigo, etc., also color it, but neither so permanently nor so brightly as the metallic materials. By long-continued soaking, the horns of all the animals above mentioned, except the deer, can be softened, and those of the sheep and goat can be easily split into several layers when they have been soaked and boiled; and these layers can not only be flattened out by putting them between smooth iron plates heated and placed in a press, but if the edges of two or more are brought together between polished copper plates, and these tightly screwed together with a hand-vice, and plunged for some time in boiling water, and thence into cold water, the edges will be found firmly welded together, and the same property enables the horn-worker to use up the smallest cuttings with profit. Another valuable property of horn is, that when heated it can be pressed into a die, and not only takes a beautifully sharp impression, but if left in the die until cold, it retains it. In this way, then, it is employed in making handles for umbrellas, knives, forks, etc., and ornamental boxes, and a variety of other articles. Combs are made of the flattened sheets, and beautiful carvings from the solid parts of the buffalo-horns brought in vast numbers from the E. Indies. Ox-horns, too, are sometimes of fine quality and color, and are fashioned into drinking-cups, and other articles, often highly ornamental. Deer-horns, which, strictly speaking, are bone, have a very limited application; they are employed in some countries for making knife-handles, called buck-horns, in much favor for pocket knives; but on the European continent the horns of the fallow-deer are extensively used in making the deer-horn articles of furniture peculiar to Germany. The deer-horns used in Great Britain are chiefly those of the Axis (*Axis maculata*), of which at least 100,000 are annually imported from the E. Indies. From the same country buffalo-horns are exported, while from S. America and other parts, the exportation of ox and cow-horns is immense.

HORNS: appendages to the frontal bones of many of the extensive family of ruminants, obviously intended as weapons of defense. In the genus *Cervus* (deer), the H. (known also as antlers) are solid, uncovered by epidermis, bone-like in composition, and deciduous. In the genus *Camelopardalis* (the giraffes), we have the single example of solid persistent H. completely invested with a hairy integument. In the other horn-bearing ruminants—as the ox, sheep, goat, and antelope—the H. are hollow, uncovered by epidermis, are composed of a special tissue (see HORNY TISSUES) quite different from bone, and are persist

ent. In all these cases, the H. are attached to the cranial bones; and in all the hollow H., except those of the antelope, the osseous axis is hollowed into cells communicating with the frontal sinuses, and thus admitting the atmospheric air into the interior. The horn of the rhinoceros is quite distinct in character from the H. in any of the ruminants. It is a tegumentary, not an osseous appendage, and is usually described as if it were a mass of hairs which had coalesced. It consists, however, in reality, of an aggregation of tubes, round which the horny matter is arranged in concentric laminæ, as in the horny excrescences on the inner surface of the leg of the horse. The first and the third variety—viz., the antlers of the *Cervidæ* and the hollow H. of the ox, etc.—are the only H. that require special notice.

For the deciduous H. of the *Cervidæ* at different ages, and their process of growth, see DEER. It need be added only that these H. are formed on two well-marked morphological types—one group possessing rounded antlers, such as in the roebuck and the red-deer; the other having the antlers more or less flattened, as in the elk and fallow-deer. A remarkable sympathy exists between the generative organs and the H.; and the development of the latter may be arrested, and their periodical shedding may be prevented by castration. As a general rule, it is only in the male *Cervidæ* that H. are developed. In the reindeer, however, they are common to both male and female.

In the hollow-horned ruminants, the bony protuberances or 'cores' arising from the frontal bones, and supporting the H., instead of branching like antlers, form more or less solid cylindrical shafts, the surface being protected by ordinary Periosteum (q.v.), and by an extension of true skin, which becomes developed into a dense horny sheath. In the accompanying figure, the horny sheath is detached from the right horn, to show the 'core' in the interior.

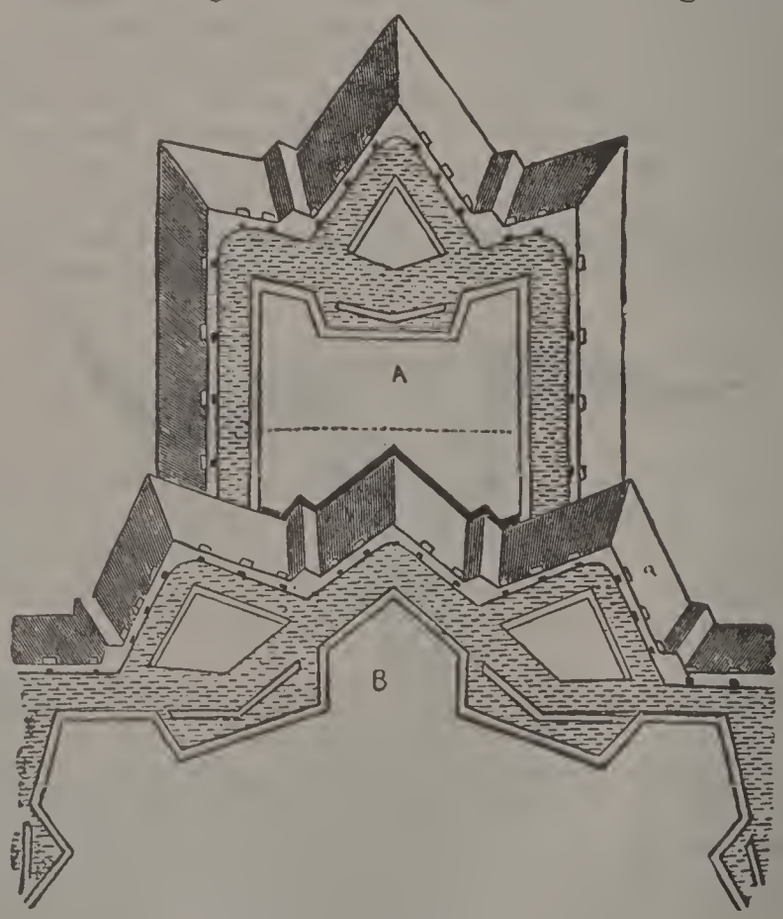
Front View of the Skull of the Ox, with the right Horny Sheath detached from the Core.

The H. of ruminants are almost invariably two in number, but exceptions occur in the case of the extinct Bramatherium and Sivatherium, and among living species, in the Four-horned Goat, the Many-horned Sheep, etc. In the Prong-horn Antelope there seems to be an approach to the cervine type, there being a prong of some length about half way up the horn, which may be regarded as analogous to the brow-antler.

HORN-WORK.

The practice of dehorning cattle, recently introduced, has warm advocates and strong opponents. The former claim that removal of the horns makes vicious animals less dangerous to their keepers, and prevents the stronger from worrying and injuring the weaker members of the herd. Opponents of the system claim that it is of little or no benefit and involves severe suffering. In England, the court of the queen's bench has decided that the removal of horns from mature animals is an unnecessary and illegal infliction of torture. The growth of the horns can easily be prevented by removing the germs when the calf is only a few weeks old. The skin is cut so as to expose the embryo horn, which has not become firmly united with the skull, and which can be readily removed with a sharp knife. The wound is then dressed with tar, and will soon heal. It is also claimed that the frequent use of caustic potash upon and around the embryo horn will permanently check its growth. Neither of these methods will cause severe or long-continued pain or prove injurious to the animal. Dehorning grown cattle is cruel, and the prevention of the growth of the horns of calves is of doubtful utility.

HORN-WORK, in Fortification: work having one front only, thrown out beyond the glacis of a fortress; with a view, 1. To strengthen a weak salient in the general out-



A, Horn-work, covering a Bastion, B.

line; 2. To occupy a plateau in advance of the place, or to protect buildings, the including of which in the original enciente would have extended it to an inconvenient degree:

3. To occupy a tongue of land protected on its sides; 4. To bar a defile; 5. To cover the head of a bridge; 6. To occupy rising ground, the possession of which would render the enemy more than necessarily dangerous. The front of a H.-W. consists of two demi-bastions connected by a curtain, and usually defended in front, as in the fortress itself, by tenaille, ravelin, and covert-way. The flanks, protected by ditches, run straight upon the ravelin, bastion, or curtain of the main defenses, so that the ditch may be swept by the fire of the latter. The flanks should not be too long for easy musketry range.

In most of the earlier works of this nature, the ditch of the H.-W. was united with the ditch of the main works by being cut through the glacis and covert-way, but in modern works the H.-W. is constructed entirely beyond the glacis, as the annexed figure shows. The masonry wall is shown in the figure by a thick black line at the head of the H.-W. and immediately beyond the glacis, but at times it is merely a straight wall thrown across, as in the dotted line.

Occasionally, H.-W. are very useful; but modern engineers generally prefer constructing detached and advanced works. A double H.-W. becomes a *Crown-work* (q.v.).

HORN'Y TIS'SUES: formerly regarded as extremely simple in structure, and as only different forms of a substance to which the term *keratin* (from *kĕras*, a horn) was applied. Recent investigations, however, show that the parts which consist of horny tissue—e.g., the persistent horns of the ruminants, the epidermis, the nails, claws, and hoofs, whalebone, tortoise-shell, etc.—have a somewhat complicated, and, in some respects, variable structure, though they are so far analogous to one another that they proceed from nucleated cells which are not morphologically developed like the cells of most other organs, but which, to a certain extent, dry up and are only agglutinated together by an intercellular substance. In a chemical point of view, they also closely resemble one another, for when compared with other tissues they all contain a large quantity of sulphur, in combination with a substance whose origin from, or affinity with the proteine bodies (q.v.), is sufficiently obvious from their behavior toward certain reagents (the caustic alkalies and the mineral and acetic acids, for example), and their percentage composition.

Horny Tissues: a cell of the underlayer; b, cell of the upperlayer; i, nucleus of the latter.

The accompanying figure represents a longitudinal section of cow's horn (magnified 410 diameters) taken perpendicularly to the surface, kept for four hours in concentrated potash solution, to which water was then added. If, however, a section of horn is examined in its natural state, it appears to consist of numberless bundles of fine threads lying side by side. After the addition of the potash solution, these bundles are seen to unfold

into little plates, which gradually expand into the regular nucleated cells shown in the figure.

The cellular structure of hoofs, whalebone, tortoise-shell, etc., may be exhibited in a similar manner. It is to the histo-chemical investigations of Mulder and Donders that we are mainly indebted for knowledge of the structure of these tissues: they seem to have established that every horny tissue contains at least three different kinds of substances—1. The substance of the cell-membranes, exceedingly difficult of solution in alkalies, and forming the principal part of the tissue; 2. The cell-contents, which dissolve more readily in alkalies; and 3. A connecting, or true intercellular substance.

These tissues have been submitted to ultimate analysis, after having been previously digested in water, alcohol, and ether. The analogy of their composition is shown in the following tabular view:

	Hair.	Horse's Hoof.	Cow's Horn.	Nails.	Epidermis.	Whalebone.	Tortoise-shell.
Carbon	50·65	51·41	51·03	51·09	50·28	51·86	54·89
Hydrogen. ..	6·36	6·96	6·80	6·82	6·76	6·87	6·56
Nitrogen.....	17·14	17·46	16·24	16·90	17·21	15·70	16·77
Oxygen.....	20·85	19·94	22·51	22·39	25·01	21·97	19·56
Sulphur.....	5·00	4·23	3·42	2·80	0·74	3·60	2·22

These tissues differ slightly in the quantity of inorganic matter which they contain, but the difference does not vary much beyond 1 per cent.

Hair yields from 0·54 to 1·85 per cent. of ash, containing, among other ingredients, peroxide of iron and a little silica. In feathers, the quantity of silica is considerable, and it is doubtless to this constituent that the shaft in a great measure owes its strength and hardness.

HORODENKA, *hō-rō-dĕn'kâ:* town of the Austrian Empire, province of E. Galicia, on an affluent of the Dniester, 106 m. s.e. from Lemberg. Pop. (1879) 10,226.

HOROGRAPHY, n. *hō-rŏg'rā-fĭ* [Gr. *hōrā*, an hour, *graphō*, I write]: an account or description of the hours.

HOROLOGE, n. *hŏr'ō-lōj* [F. *horologe*—from L. *horologium*, a clock or sun-dial—from Gr. *hōrā*, an hour; *logos*, a word]: any instrument for measuring time; a watch. HOR'OLOG'IC, a. *-lŏj'ĭk*, or HOR'OLOG'ICAL, a. *-ĭ-kăl*, pertaining to horology or time-keepers; in *bot.*, applied to flowers which open and close at certain hours. HOROLOGY, n. *hō rŏl'ō-jĭ*, the science which treats of the construction of clocks and watches. HOROL'OGIST, n. *-jĭst*, one versed in.

HOROLOGY.

HOROL'OGY: branch of applied science that relates to measurement of time. Even in the period when time, according to the modern conception of it, as measured by hours, and minutes, and seconds, was unknown, progress was early made in the measurement of larger periods of time, by observations of the heavenly bodies; for though it is now known that the movements of the more conspicuous heavenly bodies do not afford accurate marks for equable measurement of time, those movements were for practical objects, sufficient, or afforded at least the best measure then applicable. Thus, time was early divided into years, according to the motion of the sun among the constellations; into months, according to the motion of the moon relatively to the sun's place in the heavens; and into days, by the alternate light and darkness caused by the rising and setting of the sun. It was long before any accurate measure was found for a division of the day itself. The earliest measure for this purpose that we can trace is the shadow of an upright object, which gave a rough measure of time by the variations in its length and position. This suggested the invention of sun-dials (see DIAL). Another early method for the measurement of short periods of time was by the quantity of water discharged by dropping from one vessel into another: instruments on this principle were called Clepsydræ (see CLEPSYDRA). The running of fine sand from one vessel into another was found to afford a more certain measure: see HOUR-GLASS. King Alfred is said to have observed the lapse of time by noting the gradual shortening of a lighted candle. It is not easy to trace to its source the invention of the modern clock: the earliest of which we have a complete description, perhaps the earliest distinctly superior to the rude machines above mentioned, was the clock of Henry Vic or De Wyck, a German, erected in the tower of the palace of Charles V., King of France, 1379. In this simple clock, as the weight A tends to uncoil the cord and set in motion the cylinder B round its axis, the motion will be successively communicated to the various toothed wheels in the figure, and finally to the crown-wheel or escapement-wheel, I; the teeth of which so act on the two small levers or pallets, *i*, *h*, projecting from, and forming part of the suspended upright spindle or vertical axis, KM, on which is fixed the regulator or balance, LL, that an alternating or vibratory, instead of a circular, mo-

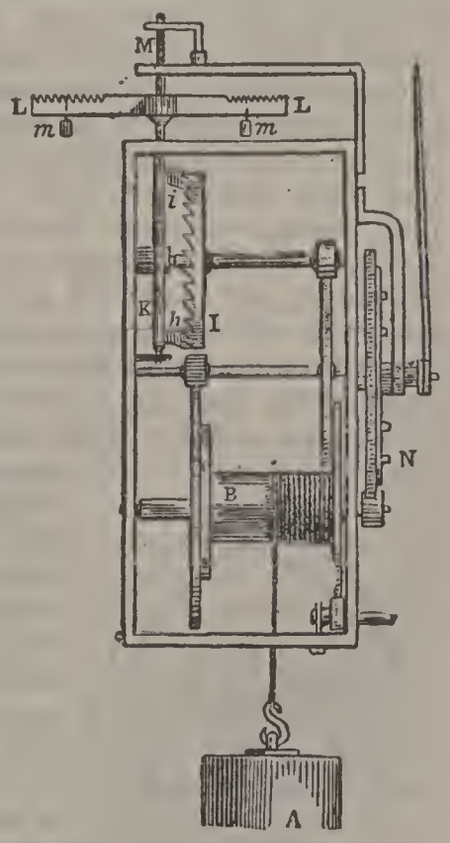


Fig. 1.—De Wyck's Clock.

tion of the balance itself is the result. The hands of the clock are attached to the wheel N, also set in motion by the cylinder B. Now, unless there were some check upon the motion, it is manifest that the heavy weight A would go rapidly to the ground, causing the wheels to rotate, the balance to vibrate, and the hands to go round with increasing velocity. In order to prevent this rapid unwinding of the clock-work, and adjust it to the more deliberate measurement of time, the balance is, in De Wyck's clock, loaded with two weights, *m*, *m*; and the further these are removed from the axis or spindle, KM, the more heavily they will resist and counteract the escapement of the levers, and the rapidity of the rotation of the escapement-wheel, till the clock be brought to go neither too quick nor too slow.

The above construction is probably the basis of all the principal time-keeping machines in the 16th c. The great epoch in the history of horology is marked by the application to it of the pendulum (q.v.) as a regulating power. This was effected by Huygens (q.v.) about 1657. This philosopher, in adapting the pendulum to the machinery previously invented, had little more to do than simply to add a new wheel to the movement, so as to enable him to place the crown-wheel and spindle in a horizontal instead of a perpendicular position, that the lower arm of the balance—then of course perpendicular, instead of horizontal, as in De Wyck's clock—might be extended, as it were, downward, and thus, in fact, be converted into a pendulum.

The principal of construction adopted by Huygens, from the peculiar action of the levers and spindle, required a light pendulum and great arcs of oscillation; and though, to secure isochronous vibration in these large arcs, the ingenious device of constraining the motion in a cycloidal curve was resorted to, yet the consequence was, as has been remarked, that 'Huygens's clock governed the pendulum, whereas the pendulum ought to govern the clock.' About ten years afterward, the celebrated Robert Hooke (q.v.) invented an escapement, which enabled a less maintaining power to carry a heavier pendulum. The pendulum, too, making smaller arcs of vibration, was less resisted by the air, therefore performed its motion with greater regularity. This device is called the *crutch* or *anchor escapement*. It was brought by Hooke to the notice of the Royal Soc. 1666; and was practically introduced into the art of clock-making by Clement, a London clockmaker, 1680. It is the form still usual in ordinary clocks. It regulates the motion as follows: The pendulum is fixed at A, and hangs down behind the pallet-wheel (the last of the train of wheel-work), which revolves in the direction of BC, under the action of the weight; B and C are the pallets. When the pendulum swings to the left,

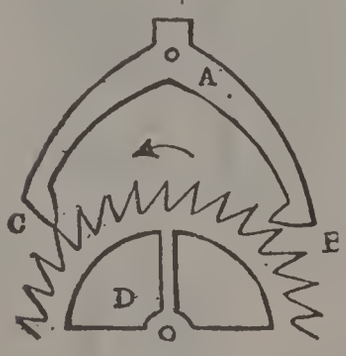


Fig. 2.

AC rises, and a tooth escapes from C, while another falls on the outside of B, and, owing to the form of the pallet B, this latter recoils during the remainder of the swing. The same thing occurs on the pendulum's return; the arm AB rises, a tooth escapes from B, and another falls on the inside of C, and is pushed backward by it during the remainder of the swing. The revolution of D is thus regularly retarded, one tooth being allowed to escape for every two oscillations—i.e., every two seconds—and as the wheel contains 30 teeth, it performs one revolution per minute (the seconds hand is fixed on the extremity of the axle of this wheel). During a portion of each contact between the pallets and teeth, the onward pressure of the wheel gives an additional impetus to the pendulum, so as to counteract the retarding effects of the resistance of the air and friction, which would otherwise bring it to a stand.

The only defect of this escapement is the recoil, and various modifications have been devised to obviate this. The first and most successful was made by George Graham, English watchmaker in the beginning of the 18th c., and his approved form is called the *dead 'scapement* or *dead-beat escapement* (fig. 3). Here the outer surface of B and inner of C are arcs of circles, whose centre is A, and a little consideration will show that there can be no recoil. This escapement is adopted in time-keepers when accuracy is required. Other inventions, as the *detached escapement*, the *pin-wheel escapement* in various forms, and the *gravity escapement* (described below), though very efficient, have not come into general use.

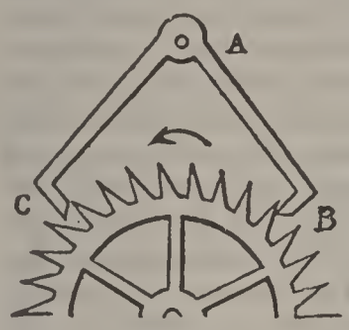


Fig. 3.

In the great clock in the new houses of parliament at Westminster, the pendulum is more than 13 ft. long, to beat 2 seconds, and its bob weighs 6 cwts. The motion is kept up by a *remontoir or gravity escapement*. On each side of the pendulum rod a small metallic hammer is hung upon a peg. 'The swinging of the pendulum first draws out a little bolt, that stopped the turning of a wheel; the wheel then goes round, under the influence of the weight, lifting one of the little hammers as it does so, until it is caught by another bolt. The hammer-head next falls by its own gravity, and strikes the pendulum-rod just as it is in the act of descending, communicating the force of its blow to quicken the movement; the same thing is afterward repeated on the opposite side of the vibration, and then again on the same side; so going on alternately.' The push thus given is evidently unvarying. The wheel has three stops and cogs on it, and goes once round in three beats of the pendulum, or in six seconds. With this contrivance 'it is found that all the teeth of the several wheels may be rough, just as turned out from the casting, and the clock will nevertheless keep better time than it would have

done with the most perfectly finished teeth under other arrangements.'

The gradual perfection of the clock required also improvements in the pendulum (see PENDULUM).

The improvements in the escapement and the pendulum above referred to bring the mechanical perfection of the clock, as a time-keeping instrument, to the point which it has attained at the present day. But the art of horology would be incomplete unless there were some standard, independent of individual mechanical contrivances, to which all may be referred, and by which the errors of each—which must exist in the most perfect human contrivances—may be corrected. The movements of the heavenly bodies are still, as of old, the only standard for a general measurement of time, affording as they do marks of unvarying certainty, to be read by all alike; and clocks and other mechanical contrivances are individual and imperfect measures of the intervals, to be trusted only until there is a new opportunity of comparing them with the certain and public signals of the heavens. These signals can be accurately read only by persons furnished with the proper apparatus, and instructed in its use. This is done in observatories, and there are now in various civilized countries sufficient opportunities of setting clocks by a communication more or less direct with observatories. When these are not to be had, the sun-dial may still be used with advantage, as means of approximation to the correct time. The time which a clock ought to mark is *mean time*, for the definition of which see DAY. The *mean time* at any *place* depends on the longitude. Supposing a clock to be set at Greenwich (England) mean time, a clock keeping mean time of any place will be 4 minutes faster for every degree of longitude e. of Greenwich, and 4 minutes slower for every degree w. Since the introduction of railways, clocks are usually set, within Great Britain, to Greenwich mean time.

The remarkable development of the railroad and telegraph systems of the United States after the close of the civil war, emphasized the anomalies of existing time standards. Travellers, railroad and telegraph authorities, and business communities were inconvenienced by the confusion caused by the differences in local standards, the running of trains by local time on different roads, and the various standards observed on a single route. Scientists individually and in corporate capacities urged the feasibility and advantages of uniformity in the mode of reckoning time. Among these, Prof. Charles F. Dowd sought to provide a remedy as early as 1860. He patiently elaborated a system of longitudinal time applicable to all parts of the country, and first submitted his ideas to a railroad convention in New York 1869, Oct. At that time the differences in local time between the e. coast of Me. and San Francisco was 4 hours, and there were 70 railroad time standards and 30 or more local standards in operation —over 100 in all, and each one differing from the others. His very detailed plans were based on the establishment of

four time belts, located 15 degrees apart, with Washington time as the prime meridian. This was a great step forward, though, as might be expected, various objections were raised against parts of the plans. Prof. Dowd persisted in his computations and efforts to enlist the co-operation of the chief railroad authorities, and modified his plans to meet their practical wants. In 1873 committees of the New England, Western, and Southern railway associations agreed to his system modified, so as to constitute the 75th meridian the prime standard, instead of Washington. In 1875, Prof. Cleveland Abbe, of the U. S. Signal Office, Sanford Fleming, of the American Soc. of Civil Engineers, J. Raymond Edmands, of Harvard Univ., Prof. J. K. Rees, of Columbia College, D. H. Bates, of the Western Union Telegraph Company, and other specialists, agreed on the four-time-belt plan, based on the 75th (near Philadelphia), 90th (near St. Louis), 105th (near Denver), and 120th (near Virginia City, Nev.), degrees of longitude, which would give exactly one hour's difference in clock time between each of these four points. Each meridian was intended to set the time for the belt $7\frac{1}{2}°$ each side of it. In this form the scheme was indorsed by the leading scientific societies of the country, recommended to the National Railroad Time Convention, and by it referred to its sec., W. F. Allen, for expert consideration. On his favorable report the plan was adopted, and the new time went into operation at noon on Sunday, 1883, Nov. 18. Beyond the four time-belts in the United States, known as the Eastern, Central, Mountain, and Pacific time standards, there is a fifth—the Intercolonial, for the railroads in Nova Scotia, New Brunswick, and the Dominion of Canada as far as Quebec, all being e. of the 75th meridian.

The methods by which time is determined in observatories belong to the details of practical astronomy. For the more ready transmission of correct time to the public, there is at some observatories a ball which is dropped by means of electricity precisely at an hour fixed and publicly known; from this clocks and watches may be set daily. By an ingenious device of recent years, public clocks in a town can be kept at every instant in perfect agreement with the mean-time clock in the observatory. This is effected by an electric connection, and a modification of Bain's electric pendulum, invented by R. L. Jones, of Chester, England, on the suggestion of Mr. Hartnup, astronomer of the Liverpool Observatory: for description, see Electric Clock. The first public application of it was to the town-hall clock in Liverpool, when for the first time was seen the curious spectacle of a great clock with works nearly 100 years old keeping time with astronomical accuracy. In the same way, a clock in the castle of Edinburgh, by whose mechanism a gun is fired precisely at one o'clock every day, is controlled by the mean time clock in the observatory on the Calton Hill.

There are now in the United States observatories performing this public service, at Harvard Univ. (Cambridge), Yale Univ. (New Haven), Albany, Allegheny, Washington,

Cincinnati, and Chicago. The Jones system is used; the standard clock is placed in the same electric current with the clocks to be controlled; and a helix in each clock to be regulated, alternately encircles two magnets attached to the pendulum, which magnets are alternately attracted and repelled by the helix. In some cities, e.g., Boston and New York, the exact instant of noon is indicated by a ball dropping, by means of an electric current, from a flagstaff on a conspicuous building.

It is not known when the alarm, or when the striking-mechanism of the clock was first applied. The alarm was adopted for the use of the priesthood, to arouse them to morning devotions. The first striking-clock probably announced the hour by a single blow, as they still do in churches to avoid noise. During the 17th c. there existed a great taste for striking-clocks, and hence a great variety of them. Several of Tompion's clocks not only struck the quarters on eight bells, but also the hour after each quarter; at twelve o'clock 44 blows were struck; and between twelve and one, no less than 113. Many struck the hour twice, like that of St. Clement Danes, in the Strand, London.

The striking part of a clock is rather a peculiar and intricate piece of mechanism. In ordinary clocks the impelling power is a weight similar to that which moves the time-measuring mechanism itself; but the pressure of this weight on the striking machinery is permitted to come into play only at stated periods in the course of the workings of the time-keeping apparatus—viz., at the completion of every hour (or half-hour) when the minute-wheel, which revolves once in an hour, and carries the minute-hand of the clock with it, brings it into action by the temporary release of a catch or detent, permitting the weight wound up on the cylinder of the striking apparatus to run down for a little, in doing which the hammer is forced into action, so as to strike the bell. Whether the strokes shall be one or many, is determined principally by the intricate action of two pieces of mechanism, one called a *snail*, from its form or outline, with 12 steps, and the other a *rack*, with 12 teeth. The time during which the striking-weight is *allowed* to descend varies according to the turning of the 12 steps of the snail on its axis, and the position of the 12 teeth of the rack, at different hours of the day; being sometimes only long enough to permit one blow to be given by the hammer on the bell, and at another time long enough for 12 such blows.

HOROMETRY, n. *hō-rŏm'ĕ-trĭ* [Gr. *hōrā*, an hour, *metron*, a measure]: the art or practice of measuring time. HOROMETRICAL, a. *hŏr'ŏ-mĕt'rĭ-kăl*, pertaining to.

HOROPTER, *hō-rŏp'tĕr* [Gr. *horos*, a boundary; *opter*, one who sees]. By fixating some distant object, one may see two images of any small object held immediately before the eyes, while but one image of the distant object

is perceived. In the first case the two images belonging to either eye are located in different positions and the object is seen double. In the latter case the two images are also present but they have an identical location, and the object is seen single. With any definite position of the eyes and body in relation to external objects, most objects in the visual field may with practice be seen double, while certain objects must necessarily be seen single. The horopter refers to all positions in space where objects must necessarily be seen single when the eyes and the body are in some definite position. The horopter thus varies with the position of the eyes. The experimental determination of the various horopters is exceedingly difficult and has not as yet been completed.

HOROSCOPE, n. *hŏr'ŏ-skōp* [F. *horoscope*, a horoscope or ascendant at nativity—from L. *horos'cŏpus*—from Gr. *horă*, an hour; *skopĕō*, I view or consider]: in *astrol.*, a representation of the aspect of the heavens at a given time, as at the hour of birth. HOROSCOPY, n. *hō-rŏs'kō'pĭ*, divination by the stars; calculation of nativities. See ASTROLOGY.

HORRIBLE, a. *hŏr'rĭ-bl* [F. *horrible*—from L. *horrĭb'ĭlĭs*, dreadful—from *horrērĕ*, to stand on end, to bristle, to shake or shiver]: exciting horror; shocking; hideous; terrible. HOR'RIBLY, ad. *-blĭ*. HOR'RIBLENESS, n. *-bl-nĕs*. HORRID, a. *hŏr'rĭd* [L. *horrĭdus*, rough, bristly]: that does or may excite horror; hideous; gloomy; terrible; offensive. HOR'RIDLY, ad. *-lĭ*. HOR'RIDNESS, n. HORRIF'IC, a. *-rĭf'ĭk* [L. *făcĭō*, I make]: causing horror. HOR'RIFY, v. *-rĭ-fī*, to strike with horror; to render horrible. HOR'RIFYING, imp. HOR'RIFIED, pp. *-fīd*. HOR'RIPILA'TION, n. *-pĭl-ā'shŭn* [L. *pĭlō*, I peel or pull off the hair]: the peculiar shuddering sensation, resulting chiefly from sudden fright or from horror, familiarly called 'hair standing on end,' or 'curdling of the blood.' HORROR, n. *hŏr'rĕr* [L. *horror*, a shaking, a trembling]: an excessive degree of fear with a shuddering; extreme dread or terror mixed with detestation; gloom; dreariness; that which excites horror. HOR'RORS, n. plu. *-rĕrz*, the painful sensation of prostration felt by the drunkard deprived of liquor.

HORROCKS, *hor'ŏks*, JEREMIAH: abt. 1619-1641, Jan. 3; b. Toxteth Park, near Liverpool, England: astronomer of remarkable genius, generally known as the first observer of the transit of Venus, an account of which phenomenon he has given in a Latin treatise, entitled *Venus in Sole visa*. He entered Emanuel College, Cambridge, 1632, May 18; and was appointed 1639 to the curacy of Hoole, Lancashire, in which village he made his famous observation (1639, Nov. 24, o.s.), while a mere youth. His death was sudden, on the day before an intended journey, having promised to visit his chief friend, William Crabtree. Dr. Wallis, his contemporary, informs us

that Horrocks at the time of his death 'had not completed his 23d year.' The death of this youth had long been recognized as a great loss to science. With little pecuniary resources, and amid many difficulties, he had pursued his purpose of self-education. Hearne, in his memoranda, tells us how Horrocks was called away during his observation of the transit (it was on a Sunday), 'to his devotions and duty at church;' to which interruption the astronomer thus alludes in his treatise: '*Ad majora avocatus, quæ ob hæc parerga negligi non decuit.*' The transit had been overlooked by Kepler, but predicted by Horrocks on calculations that he had made. He returned from his church in time to witness the forecast verified fully (3.15-3.45 P.M.). It was the first transit of Venus ever observed, one predicted by Kepler eight years before having been invisible in Europe. Newton, in the *Principia,* bears honorable testimony to the value of Horrocks's astronomical work, especially commending his lunar theory as the most ingenious yet brought forward; adding, 'and if I mistake not, the most accurate of all.' Horrocks is frequently mentioned by the scientific men of the 17th c.; the observation of the transit being regarded as not the most important of his astronomical achievements. Hevelius printed the *Venus in Sole visa,* which first appeared in Germany (1662). In 1672, Horrocks's fragmentary works were published under the auspices of the Royal Soc., being edited by Dr. Wallis, with the title *Jeremiæ Horroccii Opera Posthuma,* etc. The name of Jeremiah Horrocks, long forgotten, except by astronomers, is now, 'after the lapse of more than two centuries,' engraven on marble in Westminster Abbey.

HORRY, *awr-ē′,* PETER: date of birth and death unknown; b. probably in S. C.: revolutionary soldier. Early in 1776 he connected himself with the partisan command of Gen. Francis Marion, and subsequently attained the rank of brig.gen. After the war he applied himself to collecting material about the public and military career of his famous commander, and with the Rev. Mason L. Weems, published a *Life of Marion* (Philadelphia, 1824), which went through many editions.

HOR′SA. See ANGLO-SAXONS.

HORS DE COMBAT, *hōr′dĕ-kŏng′bâ* [F. *hors,* out; *de,* of; *combat,* the fight]: disabled from fighting by wounds or injuries, or prevented from battle by strategy.

HORSE, n. *hŏrs* [Icel. *hross;* Ger. *ross,* a horse; Norw. *hors,* a mare]: a well-known domestic animal; cavalry; a wooden frame with legs; a large stool or tressel: V. to work or furnish with a horse or horses; to ride or sit on anything astride: ADJ. applied to something large and coarse. HORS′ING, imp. HORSED, pp. *hŏrst.* HORSEBACK, n. the state of being on a horse; the posture of riding on a horse. HORSE-BREAKER, one who tames and trains young horses for the saddle or draught. HORSE-COURSER, n.

hŏrs-kōr′sér [OF. *couracier*, a broker]: a dealer in horses. HORSE-DEALER, a trader in horses. HORSE-DRENCH, a drastic purge for a horse; the horn by which it is administered. HORSE-FLY, a large fly which stings horses and sucks their blood (see FOREST-FLY). HORSE GUARDS, a cavalry regiment of the British household troops (see HORSE-GUARDS, ROYAL. THE HORSE GUARDS, in Whitehall, London, the headquarters of the British army, and the chief administrative department of military affairs —so called from two mounted sentries at the entrance: the word conventionally signifies the military authorities at the head of army affairs, as distinguished from the civil chief, the sec. of state for war. HORSE-JOCKEY, one who rides a race horse; a dealer in horses. HORSE-KNACKER, one who purchases diseased and worn-out horses, and kills them in order to manufacture their carcasses into commercial products. HORSE-LEECH, a variety of leech; a veterinary surgeon. HORSE-LAUGH, a loud, boisterous laugh. HORSE-MACKEREL: see TUNNY. HORSEMAN, n. a rider on horseback; one skilled in riding. HORSEMANSHIP, n. the art of riding or managing horses. HORSE-POWER, the commercial unit of power. It is equal to 33,000 foot pounds of energy expended in one minute or 550 foot pounds per second. Its electrical equivalent is 746 Watts. HORSE-RACE, a running match between horses to test their speed and endurance (see HORSE-RACING). HORSE-SHOE, a curved iron plate nailed on the feet of horses (see HORSE-SHOEING). HORSE-SHOE MAGNET, an artificial magnet in the form of a horse-shoe. HORSE-SOLDIER, a soldier on horse-back. HORSE-TAIL, a Turkish standard; a plant of the genus *Equĭsētŭm*, ord. *Equĭsētācĕæ* (see EQUISETUM). TO HORSE-WHIP, to strike or chastise with a riding-whip.

HORSE (*Equus*): genus of pachydermatous quadrupeds of the family *Equidæ* (q.v.), or *Solidungula*, generally regarded as including all the species of the family, though sometimes limited (see ASS), to contain only one species, the most important to man of all animals that are used as beasts of burden and of draught. For the principal zoological characters, see EQUIDÆ; ASS. The native country of the horse is uncertain. Some contend for Asia, and some for Africa; some suppose that the horse was domesticated first in Egypt, and quote Scripture in support of their opinion, but to no better purpose than to show that at a very early period the horse was in use as a domesticated and valued animal among the ancient Egyptians; while others adduce arguments not more conclusive to show that it was originally domesticated in the n.e. of Asia; some think it probable that Europe also, and even Britain, had indigenous horses. Whether certain wild races of Central Asia and n. Africa are really indigenous to the regions in which they are found, or the offspring of animals which have escaped from domestication, like those of America; and whether

the origin of the domestic horse is to be referred to one original form, or to several forms somewhat different, and belonging to different countries, also are questions uncertain; and the last of them is very similar to that which is so much agitated respecting the dog (q.v.), though the diversities are not so great as in that case.

The lips and teeth of the horse adapt it for cropping the short herbage of dry plains or hills, so that it finds abundance where an ox would be very insufficiently supplied. The feet also are adapted to dry rather than to soft or swampy ground. On soft ground, not only is the foot apt to sink, not being very broad, but the horny hoof is softened, and a diseased state of the feet is the result, as in the case of many of the great dray-horses of London, reared in the alluvial districts of e. England. The horse, however, requires a liberal supply of water; and during the dry season, in the hot plains of S. America, great troops of wild horses often rush furiously to the rivers, and as they approach the drinking-place, trample one another under foot, vast numbers of skeletons remaining to bleach in the sun.

Wild horses are found on the plains of Central Asia. Some also inhabit mountains or hilly districts there and in n. Africa. They abound still more in the grassy plains of N. and S. America, though they were introduced into America by Europeans; and certain tribes of Indians, both in N. and in S. America, have become at least as equestrian in their habits as any of the Tartars of the East. Wild horses are found also in the Falkland Islands, into which they were introduced by Europeans, and a peculiar breed has been found wild in the island of Celebes.

The races or varieties of the horse have an evident relation to the climate of the countries in which they occur. Those of cold and stormy regions are comparatively small and rough-haired; those of more favored climates, large and sleek. There are also differences, more evidently to be ascribed to domestication, according to which certain breeds are adapted particularly to certain kinds of work, some excelling in fleetness, some in endurance, some in mere strength for burden or draught. The slender form of the race-horse or hunter contrasts almost as strongly with the ponderous solidity of the dray-horse, as the great size of the latter does with the diminutiveness of the Shetland pony.

Wild horses congregate in troops, sometimes small, but sometimes of many hundreds. The males have fierce contests for the supremacy, and males that have contended unsuccessfully are often driven off to a solitary life. On the appearance of danger, the chief stallion of a small troop seems to direct the movements of all, and even the largest troops seem instinctively to move in a kind of concert, so that when they are assailed, the stronger animals oppose the enemy, and protect the younger and weaker. Wolves, even when in packs, attack with success

HORSES.

1. Arabian.
2. Anglo-Norman.
3. Percheron.
4. Belgian.
5. Swedish Pony.
6. Hungarian.
7. Shetland Pony.
8. Yorkshire.
9. Oldenburg.
10. Trakanian.
11. English Thoroughbred.

only weakened stragglers, and even the jaguar is repelled.

In fighting, horses either raise themselves on their hind-feet, and bring down the fore feet with great force on the enemy, or wheeling about, kick violently with the hind-feet.

The *Tarpan* of Tartary is one of those races of wild horses sometimes regarded as original, and not descended from domesticated animals. It is of a reddish color, with a black stripe along the back, and black mane and tail. The eye is small and vicious. Tarpans are sometimes caught by the Tartars, but are with great difficulty reduced to subjection. In some of the steppes of central Asia are wild horses of white or dappled-gray color.—The wild horse of S. America is there called the *Mustang*. It exhibits considerable diversity of color, but bay-brown is the most prevalent. It is strong and active, and is often taken with the lasso, and employed in the service of man. A curious method is practiced by some Indian tribes of promptly subduing its wild nature, and rendering it tractable, by blowing strongly with the mouth into its nostrils. By other tribes, it is subdued more rudely. It is thrown on the ground, and ere it can recover, a man gets upon its back, whom, when it rises, it cannot shake off, and who retains his seat until it is quite submissive. The *Koomrah* of N. Africa is regarded by Col. Hamilton Smith as a distinct species (*E. hippagrus*). It has no forelock, but woolly hair on the forehead, is of a reddish bay color without stripe on the back, or any white about the limbs, has limbs of a somewhat ass-like shape, and the tail covered with short hair for several inches at the root. It is an inhabitant of mountainous regions.

Of domestic varieties and breeds of the horse, the number is very great, almost every country or considerable district having one or more of its own, and particular breeds being valued for their fitness for particular purposes. The breeds are also continually varied by crossing, and great improvements have thus been effected. The superior fleetness of the English race-horse and endurance of the hunter are ascribed to the crossing of the old English breed of light-limbed horse with the Arabian; and the English dray-horse, remarkable for its great size and strength, in like manner, owes much of its excellence to the crossing of the largest old English breed of draught-horse with the Flemish. A breed produced by crossing one of the lighter kinds of English draught-horse with the race-horse, is in the highest esteem for carriage-horses. N. America has a breed of light-limbed horses, remarkable for fast trotting. The *Suffolk Punch* has been the origin of many of the most useful kinds of draught-horses employed in Britain for ordinary farm-work. The *Clydesdale Horse* is also one of the best breeds of this class, and is an improvement on an older breed. Numerous breeds of smaller size, *ponies*, have long existed in almost all countries. The *Shetland Pony*, which, com-

pared with the dray-horse, is like a pocket edition of a book beside a great folio, is most prized when most diminutive, and sometimes does not much exceed a large dog in stature. A strong man has been seen to lift one with his arm: and to ride on its back while he walked with his feet on each side on the ground. The Shetland pony is, however, very hardy, and remarkably strong.

The Arabian horse has long been the object of untiring care and attention, and to this much of the excellence of the race is certainly to be ascribed. The regard of the Arab for his horse has long been famous. Very similar in some respects to the Arabian is the Barbary horse, highly prized in w. Europe before the Arabian was known there, and from the name of which is derived the English word *barb*.

The horse has been used from most remote ages both for riding and for drawing carriages; but rather for pomp or pleasure, the chase, and war, than for agricultural or other labors, for which oxen and other animals were for a long time more generally employed. The horse is an animal of no little intelligence, docility, and affectionateness; qualities of which the display would certainly be more general and perfect, if it were not for the cruel treatment so commonly practiced in 'breaking' and otherwise. The horse has a strong memory of places, and finds again readily a road which it has once travelled before. Its caution in advancing on swampy ground has often excited admiration. It seems often to enter with a kind of enthusiasm into the work in which it is engaged: the war-horse evidently delights in the martial music and military movements to which he has been accustomed; the racer and the hunter seem to know the object of their exertions, and to be as keenly bent upon it as their riders; and the draught-horse often exhibits much acquired expertness in situations of considerable difficulty. Instances are on record of the remarkable display of intelligence also in such things as the opening of doors, corn-chests, etc.; and two instances are known of horses which have learned to turn the tap of a water-barrel in order to obtain water, one of which also ended by shutting it again. A horse has been seen to procure a supply of apples in an orchard by throwing himself forcibly against the trees and shaking them.

The flesh of the horse is used as food in some countries. Its use has recently found advocates in France and some other parts of Europe (see HIPPOPHAGY). It is sold in London as food for dogs and cats. Mares' milk is much used by some of the tribes whose chief wealth consists in their horses: and the Kalmucks subject it to fermentation, and distil from it a kind of spirit. The hide of horses is made into leather, is used for covering large office and board-room tables, etc. The long hair of the mane and tail is used for making haircloth, stuffing mattresses, etc.

Fossil Horse.—The remains of the horse have been long noticed associated with the mammoth, rhinoceros, and other extinct quadrupeds, in the drift formations and ossiferous caverns in the new world, as well as in the old. Their occurrence in America is more remarkable, from that continent presenting no specimens of the horse when it was discovered by Columbus. Cuvier was unable, in the fragments that he examined, to see any difference from the similar portions of the existing species. Meyer and Kaup have pointed out distinctive characters, and Owen has shown that the remains observed in Britain belong probably to two different species. The largest (*Equus fossilis*) was about the height of a middle-sized domestic horse and differed from this animal in possessing a proportionally larger head and jaws, resembling in this respect the wild horses of Asia described by Pallas, and in having the molar teeth, while equal in length, yet decidedly smaller. The second species (*Equus plicidens*) was about the size of a large ass, with different teeth. See MAMMALIA; FOOT; HORSE, FOSSIL.

Horses, of whatever breed or description, should be of good size, shape, and style; for superior animals are fed and kept at the same cost as inferior sorts, are always able to perform their work easily and satisfactorily, and are at any time saleable at remunerative prices. To produce such animals, requires careful selection of sound, active, symmetrical, well-descended parents. The mare carries her colt 11 months, but occasionally exceeds her time by one or two weeks. Farmers prefer their mares to foal in May, from which time the age is generally calculated, but on the turf, ages date from January, and hence the earlier the racing foals are dropped the better. Parturition is usually performed easily and without any assistance, the foal soon rising to his feet, and sucking. Good grass, with a feed of oats daily, will insure abundant supply of milk. Weaning may take place in five or six months; and the foal, when taken from its mother, must be supplied with a few oats and bran, some good hay, and comfortable shelter at night. At a year old, colts are generally castrated; and are gently broken in and lightly worked when about three years old; but, under good treatment, they continue to grow, and ought not to be put to severe work until they are five years old.

Oats and hay are the staple articles of food for hard-working horses. The oats should be sound, sweet, and heavy; and for hacks and hunters, are seldom sufficiently dry until they are a year old. With good hay, 10 pounds of oats is a fair allowance. To insure thorough mastication and digestion, oats should be given either slightly bruised, or with some chaff. For coaching or farm work a few beans or peas should be given; half a bushel, with a bushel of oats and hay, is a usual weekly allowance for farm horses. Riding-horses, eating a fair allowance of oats, consume daily 14 pounds of hay; but the heavier

class of horses require more. Farmers use oat, pea, and bean straw for fodder during the winter months, and in most well-managed establishments, a considerable portion of the fodder is now given cut, which enables the hard-worked horse to fill himself more rapidly, and thus gives him more leisure for rest and repose. Cart-horses usually have an evening allowance of sliced Swedish turnips or of carrots; a daily pound of linseed-cake is now frequently added, to keep the coat glossy; while a weekly bran-mash is advisable, and should contain during winter an ounce of pounded nitre. Horses should be liberally supplied with water at least three times daily, nor is it ever necessary to restrict the supplies, except for a few hours before severe fast work, and when the animal is much overheated and fatigued. In some well-constructed boxes and stables it is so arranged that water is constantly before the animal in a shallow vessel capable of holding about a quart, and which as it is removed, is slowly replenished, and thus cannot be drunk either with undue rapidity or in injurious quantity. During summer, horses generally have such green food as grass, clover, or vetches; but if their work is severe or long continued, oats and hay ought still to form the principal articles of diet. In summer, farm-horses are often turned out to graze after their day's work is over; but it is generally more economical to bring their green food to the stable, or, better still, to commodious yards. It is seldom advisable to follow the old-fashioned plan of turning hacks or hunters out to graze, as they are apt to get kicked or otherwise injured, and besides to lose their condition. If not required during the summer months, they are better and safer in a large yard or a commodious box, where they can have proper feeding and daily exercise. They will thus, at little extra expense, be kept in good condition, and fit for work, their legs free from blemishes, and their constitutions uninjured by violent diversities of feeding and management. The small stomach and natural habits of the horse indicate the necessity of his being fed at frequent moderate intervals of five or six hours. In most localities, farm-horses are brought out at 7 A.M., returning to the stable at 11.30 or 12, being fed and rested for an hour and a half or two hours, and then returning to work for four or five hours. In some places the straggling position of the fields, and their inconvenient distance from the stables, induce many farmers to keep their horses in the yoke from 7 A.M. till 2 or 3 P.M., when they finish for the day. This practice is not commendable, unless the work is very light, and the horses have a feed, a few mouthfuls of water, and 10 or 15 minutes' rest about midday.

To insure health, horses must be kept in commodious, well-lighted, airy, properly-ventilated stables, which ought to be erected only in dry situations, should be thoroughly underdrained, and well paved, if possible without a loft overhead, whitewashed annually, and always kept scrupulously clean and free from smell. This may be effected by prompt removal of soiled or wet litter, and by strewing the floors daily with a little gypsum, or M'Dougal's disinfect-

ant powder. Where there is room, loose boxes are preferable to stalls, especially for the lighter sort of horses, that spend much of their time indoors. With proper feeding, exercise, and grooming, with plenty of fresh air, and good stable management, horses are scarcely ever out of health, and require neither balls, cordials, nor any such messes. Without professional advice, no groom should, under any pretense, be permitted to indulge his predilection for physicking or doctoring healthy horses. See HORSE-RACING: HORSE-SHOEING: HORSE, FOSSIL.

HORSE: miner's term for any intruded material which is the apparent cause of a sudden interruption in the continuity of a mineral that is being quarried. With vein-miners, a detached mass of rock or spar which fills the vein receives this name, while colliers apply the term to the shale which occupies a natural but sudden thinning out of the coal-bed, as well as to such interruptions as seem to have been the channels of small streams, and which were subsequently filled up by the clay that formed the roof of the coal.

HORSE, FOSSIL: early horse-like remains, by which the development of the modern horse is considered to have been traced. They have been found in the eocene, pliocene, and miocene periods of Europe and America; but the most interesting as well as numerous fossils—those which exhibit the changes from the four-toed to the present single-toe foot—have been discovered in the quaternary of N. America (12 forms having been disclosed) and in the tertiary (30 forms disclosed). All these antedate the discovery of America, for science has not been able to locate any native living species of horse or ass in either N. or S. America since that period. The earliest known animal of the horse family—the *eohippus* of Prof. Othniel Charles Marsh—was found in the lowest part of the eocene basin of Green river, and had three toes on the hind foot and four perfect ones on the fore foot, with an imperfect fifth development on the fore foot. The two bones of the leg now united were then separate, and the animal was about the size of a common fox. In tracing what is considered to have been the evolution, after Prof. Marsh had discovered the root of the investigation, we pass to Marsh's *orohippus* of the middle eocene, where a specimen of similar size loses the imperfect fifth development (rudimentary thumb) on the fore foot, and shows four toes and separate leg bones. In the lower miocene is the *mesohippus*, in which the fourth toe is useless and similar to the rudimentary thumb of the *eohippus;* and also the *miohippus*, about the size of a sheep, in which the leg bones have united, though showing distinct formation, with an almost entire absence of the rudimentary growth, and an expansion of the middle part of the hoof. The upper miocene and lower pliocene give the *protohippus*, an animal larger and more like the present horse than the *miohippus*. In this the fourth toe has wholly disappeared, the two side ones are smaller, shorter, and of little use, and the middle of the hoof exhibits further broadening.

The pliocene also developed the *pliohippus*, with a single full toe and small remains of the two outer ones; and the quaternary yielded the modern horse, with full, rounded, and single-toed hoof. Prof. Marsh conjectures that an earlier specimen than the first here described, probably in the lowest eocene, had four toes on the hind foot and five on the fore foot; and that a still older ancestor, as far back as the cretaceous, had on each foot the five full toes of common mammal life. Beside the pedal feature of this development, large interest is found also in the progression because it shows an increase in the size of the animal, elongation of the head and neck, change in the number (44–40) and character of the teeth, modification of the skull, and union or concentration of the leg-bones which gives the quaternary and modern *equus* far greater speed than the *eohippus* had. Many arguments have been urged against the theory of gradual evolution, in spite of the conclusions of Profs. Huxley and Le Conte and the profound researches of Prof. Marsh, to whom Charles Darwin wrote: 'Your work on . . . the many fossil animals of North America, has afforded the best support to the theory of evolution that has appeared within the last twenty years.' Some opponents, while admitting the possibility of structural similarity in the different genera as formerly classified, deny that evidence exists proving one genus to have been the progenitor of another, or that the various species came from a common origin. Others assert that structural characteristics, if traced from one genus through the others, will at least warrant the conclusion that one genus could not have produced another, and that no one was produced from another by any law of 'natural selection.' Still Prof. Marsh believes the line of descent to have been direct, and that the remains now known supply every important intermediate form. On the gradual disappearance of the toes he gives the conjecture that it 'may have been due to elevation of the region inhabited, which gradually led the animals to live on higher ground instead of the soft low lands where a many-toed foot would be most useful.'

HORSE-CHEST'NUT (*Æsculus*): genus of trees of nat. ord. *Sapindaceæ*, having large opposite digitate leaves, flowers with five spreading unequal petals, and a leathery 3-valved capsule covered with soft spines. The seeds, not more than three in each fruit, are large, and somewhat resemble chestnuts; but the habit of the trees, their leaves, and their flowers, are very unlike those of chestnuts, with which they have no botanical affinity. The genus is indigenous in N. America, and in mountainous parts of Mexico, New Granada, Persia, and n. India, and the Malayan peninsula.—The COMMON H. (*Æ. hippocastanum*) is a much esteemed ornamental tree, frequently planted in all parts of Europe of which the climate is suitable, on account of its rich foliage, and its erect racemes of beautiful reddish white flowers produced at the extremities of the branches, and contrasting admirably with the dark green of the leaves. At St. Petersburg, the H.

is a greenhouse tree. It is supposed to be a native of Persia or some part of the East; but this is uncertain. It was introduced into w. Europe, from Constantinople, in the end of the 16th c. It attains a great size, sometimes rising to the height of 100 ft., and extending its branches very widely, while they often droop almost to the ground. The leaves have long stalks, and seven obovate-wedge-shaped leaflets. The bark is bitter and astringent, containing a bitter principle called *Æsculine;* it has been used in tanning and dyeing; that taken from branches not very old has been extensively used on the continent of Europe as a substitute for Peruvian bark. The wood is light colored, soft, and useful mainly for paper pulp, and small articles; it contains a large quantity of saponaceous material, so that country people use the mucilaginous sap as soap. The seeds are bitter but are eaten by cattle and sheep, with the preparation of boiling in alkaline water which is necessary in Europe; and from them a flour is made especially adapted to bookbinders' and shoemakers' paste, as, besides having great tenacity, it will not be attacked by insects. In France starch is produced from horse-chestnut seeds on a large scale. The seeds are also used in the southern United States to impart a flavor of age to raw whiskey. The other species of *Æsculus* are natives of N. America. The foliage is very similar to that of the common horse-chestnut. Both the leaves and fruit, however, of the BUCKEYE or AMERICAN HORSE-CHESTNUT (*Æ. Ohiotensis*) are very poisonous. N. America possesses also a number of species of a nearly allied genus, *Pavia*, with very similar foliage, smaller flowers, and smooth fruit. The seeds of *P. macrostachya* or *P. edulis*, the EDIBLE BUCKEYE, are eaten, either boiled or roasted. The species is a shrub with long and beautiful racemes of fragrant white flowers, which have long projecting stamens. It is a native of the southern states, and seldom ripens its fruit in England. *P. Indica* is a lofty tree, growing at elevations of 8,000-10,000 ft. in the Himalaya, and producing seeds very similar to those of the HORSE-CHESTNUT, which, though bitter, are eaten in times of scarcity.

HORSE-COPER, -COOPER, or -COUPER: see under COPE.

HORSE-PLAY, rough and frolicsome play attended with boisterous noise—*horse* being a recognized Eng. prefix to denote something large and coarse, as 'horse-radish.' *Note.*—HORSE-PLAY is alleged to have no connection with 'horse,' but that the first element is simply the Gael. *orais*, a rough, tumultuous noise, and the meaning is 'play of a rough, boisterous kind.'—Dr. C. Mackay.

HORSEFIELD, THOMAS, American naturalist and explorer: b. Bethlehem, Pa., 1773, May 12; d. London, England, 1866. He was graduated in medicine at the University of Pennsylvania, and served as 'medical apprentice' in the Pennsylvania Hospital from 1794-99, being the fifth interne in the hospital in the order of

appointment. In 1799, October, he accepted service as surgeon on the 'China,' about to sail for Java. He returned in the latter part of 1800, but in 1801 went again to Java for the purpose of thoroughly exploring the island, and was commissioned as regimental surgeon by the Dutch Colonial Government. From 1802 he devoted himself to the thorough examination of the flora, fauna, and geology of the island, at first under the auspices of the Dutch government, and, when possession of Java was taken by the English, under the especial patronage of Sir Thomas Stamford Raffles, the lieutenant-governor. A warm friendship, due to kindred tastes, sprang up between Horsefield and his celebrated patron, and, when the English tenure of Java ceased and Sir Stamford Raffles returned to England, Horsefield accompanied him, bringing with him the collections he had made, which were placed in the museum of the East India Company in London, of which he was presently made the curator, a position which he held for nearly fifty years until his death. Horsefield, by his explorations and writings, laid foundations for our knowledge of the natural history of the far East. He contributed while in Java many important papers to the publications of the Batavian Society of Arts and Sciences. In 1824 he gave to the world his great work entitled *Zoological Researches in Java and the Neighboring Islands*, and from 1838-52 issued in folio parts the *Plantæ Javanicæ Rariores*. Both works are sumptuously illustrated by colored plates. In 1856-58 he published the *Catalogue of the Birds in the Museum of the East India Company*, and in 1857-59, with Frederic Moore, the *Catalogue of the Lepidopterous Insects in the Museum of the East India Company*. Besides these larger works he was the author of a multitude of papers published in the *Transactions* and *Proceedings* of societies.

To him perhaps more than to any other single naturalist are we indebted for the first correct account of the botany and zoology of the regions with which he became familiar in his early life.

HORSE-GUARDS, Royal, or Oxford Blues: the third heavy cavalry regiment of the Household Brigade in the British army. The regiment was raised 1661 from the remnants of the disbanded army of the late Commonwealth. It has ever proved a loyal corps, although it readily transferred its allegiance from James II. to William III. It took part in Marlborough's campaigns; served under the Duke of Wellington in the Peninsula and at Waterloo, and has always been considered one of the finest heavy cavalry corps in the world. The guards of state for the sovereign are taken either from its ranks or from those of the Life-Guards. The present uniform consists of a steel helmet, with plume, a steel cuirass over a blue coatee, leather breeches, and knee-boots; the horses are black. The establishment of the regiment

consists of about 30 commissioned officers, and 400 non-commissioned officers and rank and file.

HORSEMANSHIP: art of managing the horse and riding on his back. Through all history it has ranked high among useful and graceful accomplishments. According to Cæsar and Livy, the Numidians and Mauritanians rode their horses without either bit or saddle, and guided them solely by using a small switch, which was applied to either side of the neck, according as they wished to turn. The Persians trained their horses to kneel to receive their riders, and were the first to introduce saddles. Saddles of a similar shape to those now in use were not known till the 14th c., and side-saddles were introduced about 1388. Stirrups were used in the 5th c., but were not common even in the 12th.

The two essentials for riding are a firm seat and a light hand, as without a combination of the two no one can become a good horseman. In every description of riding, the light, delicate 'hand,' just feeling the mouth of the horse, and playing the bit in accordance with his movement, will insure success; and it is to this delicacy of wrist that we must attribute the ease and skill with which ladies often ride the most high-spirited animals, which in rougher hands, would be unmanageable.

The first lesson in horsemanship is to learn to mount safely and easily; and the ordinary, and on the whole least objectionable way, is as follows: Stand at the shoulder of the horse, looking toward his tail, and taking the reins in the right hand, divide them by the middle-finger of the left till you feel the horse's mouth; then take hold with the left hand of a lock of the mane, lift the left foot into the stirrup, and using the mane as a slight hold, spring into the air, taking hold of the back of the saddle to assist in getting the right leg easily over the horse, steadying the fall of the body by the right hand on the pommel, and then arranging the stirrups. In dismounting, exactly the reverse of this process is followed, or both feet may be disengaged from the stirrups at once, and the rider may vault from the saddle to the ground with greater rapidity, and less risk of falling if the horse chance to move on.

There are four different styles of riding practiced among modern civilized nations—viz., the military, road, hunting, and racing styles. The military style differs in many particulars from the others, as, owing to the long stirrups used, the soldier is obliged to sit well down in his saddle, with his body erect, the seat being preserved more by balance than by a tight hold by the leg or thigh.

In the seat for road-riding, the stirrups are arranged at such a length that when the feet are hanging loose, they shall just touch the ankle-bone, and the rider usually inserts the feet only as far as the 'ball' of the foot. In riding, have the horse well in hand, to assist in supporting him, in case of stumbling; the seat firm, to be secure

in case of shying; and a knowledge of handling the bridle, to insure a quick and ready response. In hunting, a much firmer seat is necessary; the stirrup-leathers are about two holes shorter, the feet pressed 'home' in the stirrups, which otherwise would be apt to be lost in jumping; the leg from thigh to the knee well forward, and nearly at right angles to the upper part of the body as inclined forward; the legs perpendicular, the heel well down, and the toe pointing nearly straightforward. This 'seat' the hunter has in common with all equestrian nations, as the Arabs, Tartars, Persians, Egyptians, Cossacks, Magyars, and Circassians, the last mentioned nation carrying it to such an extreme that the leg assumes the form of the letter V, with the knee for the apex. In riding at a fence, 'collect' the horse into the pace at which he goes with most ease to himself; keep him straight at the fence till he rises; 'ease' his mouth by leaning forward; take especial care not to confine it when he is making his effort, or you will pull him into the fence as he descends; lean well back in the saddle, and gently take hold of his mouth to support him on landing. Do not gallop with a loose rein (excepting down-hill, when the horse requires his head free), for the horse will go with a straggling pace, which is very undesirable. For racing, the essentials are a good and powerful seat, good 'hands,' a great knowledge of pace, and quickness to take advantage of any chances of success. The jockey's seat is peculiar, as his object is to give as much ease as possible to his horse. He rides very much forward, frequently standing in the stirrups, and regulating his pull at his horse according to his orders.

As the strongest part of a horse, and also the centre of action, is at a point just behind his shoulder-blades, the nearer one can ride to this the better, and riding rather forward in the saddle is a relief to the horse, while leaning back, as it bears upon his loins—his weakest part—is a cause of fatigue. The grip in riding should be obtained by the knee, the thighs and the calves slightly. The thigh is the most essential part of a good and strong seat. Few riders whose thighs are short and round, have a good seat; while, on the other hand, jockeys and tall, thin men, whose thighs are long, and more or less hollowed on the under-side, are generally very firm.

No one can pretend to horsemanship without a knowledge of the proper action for emergencies. If a horse runs away, do not exhaust yourself by vain pulling, but guide him out of danger, and let him run till he is tired. A Bucephalus noseband is a great security against bolting. If a horse rears, loosen the reins, and lean forward; in hunting, the 'art of falling' consists in getting clear of your horse. In case of a horse kicking, keep his head up as much as possible, and sit firm in the saddle.

HORSENS, *hŏr'sĕns:* very old town and seaport on the e. coast of Denmark; one of the prettiest and most thriv-

ing in the country; at the head of the fiord of Horsens, 25 m. s.w. of Aarhuus. It contains two churches, has four bridges, and carries on manufactures of tobacco, and considerable general trade. Pop. 17,290.

HORSE-POWER: a term used for expressing the power developed by a mechanical motor or engine. It was originally selected by James Watt as a basis on which to sell his engines. One horse-power is a quantity of work equivalent to that which is expended in raising a weight of 33,000 pounds to the height of one foot in one minute, or a weight of 550 pounds to the height of one foot in one second. It is expressed in foot-pounds, and is designated as A.H.P.—Actual or Available Horse-Power, or B.H.P.—Brake Horse-Power; N.H.P.—Nominal Horse-Power, a comparatively obsolete term used by some manufacturers to designate the size of an engine; I.H.P.—Indicated Horse-Power, the foot-pounds of work done behind the piston; and F.H.P.—Friction Horse-Power, the number of foot-pounds of power lost by the friction of the engine.

HORSE'RACING: favorite sport, dating from the times of the early Greeks and Romans. In England, Charles I., Cromwell, and Charles II. were more or less patrons of the turf; and the last-named monarch was a regular frequenter of Newmarket, which, partly from this reason, became the metropolis of racing. William III. and Queen Anne also were patrons of horse-racing. Flying Childers, bred 1715 by the Duke of Devonshire, was long considered to have been the fleetest horse ever known; he carried nine stone at Newmarket, and ran 3½ m. in 6 minutes 40 seconds; he was never beaten, and produced 497 winners, besides realizing £200,000 in stakes. The celebrated horse Eclipse, the fleetest from the time of Childers, was bred 1764 by the Duke of Cumberland. Commencing at five years old, this horse won eleven plates, was never beaten, and became the sire of innumerable winners. The modern race-horse is considerably taller and of earlier maturity than the original type, partly from judicious crossing, also from early high-feeding and training; yet there has been a loss of stoutness of constitution, though, for speed, no pure bred Arab has a chance with a modern thoroughbred. The horses are entered as yearlings (a race-horse's age dates from Jan. 1 in the year in which he is foaled); but of 240 entered in this way, rarely more than 25 come to the post two years afterward, the majority being found practically useless for racing purposes, and the forfeits from these horses thus 'scratched' form by far the greater portion of the splendid prizes of the turf. (It has been calculated that there are 1,500 thoroughbred brood-mares in England; that these produce annually about 1,100 foals.) The value of a thoroughbred yearling depends entirely upon 'the fashion' of his blood; as much as 3,000 guineas have been given, and 1,000 and 1,500 are by no means

extravagant rates for promising colts. The training of the young racer commences in his second year, when he is placed under a trainer, in an establishment such as those at Newmarket, Middleham, Richmond, Malton, Ilsley, Epsom, etc., where the downs offer a wide expanse of open country for exercise. The trainer's charge is two guineas a week; and for this, each horse is personally attended to and ridden by a lad specially attached to him. A thorough preparation for a great race is a long and troublesome operation, consisting of several stages, during which the colt is gradually brought from a naturally loose condition to the greatest perfection possible: first, by steady and continuous walking exercise, then proceeding by gradual stages to gentle galloping and sweating, and finishing by testing the capacity of the colt against a competitor at a distance equal to the forthcoming race. It has been found that, practically, the speed of almost all horses can be equalized by addition or subtraction of weight to be carried when running; and so nicely is this adjusted, that the Handicaps (q.v.), arranged on this principle, provide some of the best races in the year. The Chester Cup, Doncaster Cup, Ascot Cup, Goodwin Cup, Liverpool Cup, Cezarewitch and Cambridgeshire stakes, all are run on these terms. For the great prizes of the turf, however, the 1,000 and 2,000 guineas, the Derby (about £6,000), Oaks (about £4,000), and St. Leger (about £5,000), for three-year-olds, the horses run on an equality of age and weight.

Enormously large as are the stakes run for—more than £200,000 annually—this is as nothing to the money which annually changes hands in betting. Betting-men may be divided into two classes—those who back a single horse from judgment, or private information; and those who, without any knowledge, but from mere calculation, estimate the odds, and take the 'field' against 'any favorite.' The latter class are the professional betting-men ('the ring'), who devote themselves to the pursuit; the former is composed of the owners of horses and their friends, who trust to their knowledge and tact. Colossal fortunes have been made by the 'ring' in this way, and there are men perpetually attending the country races, and ready to lay against any horse and 'back' the 'field.' As no debts incurred by betting are recoverable by law, they become debts of honor; and any 'defaulter' is amenable only to the regulations of the turf, which have been devised to insure, as far as possible, honest dealings. The Jockey Club is the great tribunal of sport in England, and its regulations are adhered to all over the country: it is composed of 64 noblemen and gentlemen, who take an interest in the turf. Newmarket Heath, the great centre of racing, is in its possession, and by virtue of the position and authority of its members, it is enabled to exercise a great check upon dishonesty and fraud. The seven annual race-meetings at Newmarket are as follows: the

Craven, first spring, second spring, July, first October, second October, and the 'Houghton.' The principal races are for the 1,000 guineas, 2,000 guineas, Cezarewitch, and Cambridgeshire. The Epsom meeting is the most popular, from its nearness to London, and from the interest attaching to the races for the Derby and Oaks. After Epsom, the Doncaster St. Leger, for three-year-olds, claims the position of greatest interest; it is run for by the competitors in the previous Derby and Oaks, and is generally considered a test of the correctness of their results. Ascot is reckoned the most fashionable meeting in the year; it is held on Ascot Heath, in Berks, and here the best horses in England compete, at a more mature age than at other races. In the race for the Ascot cup 1854, West Australian ran the 2½ m. in 4 minutes 27 seconds, the fastest race on record. Goodwood meeting, in the Duke of Richmond's park, in Sussex, also is popular. There are more than 150 race-meetings annually in the United Kingdom; more than 1,600 horses run at these, and 160 jockeys are in constant employment. A good jockey is considered so valuable, that he is always retained by one or more masters, for a considerable sum, and these gentlemen have a call upon his services in a certain rotation. The regular pay of a jockey is £5 for a winning and £3 for a losing 'mount'; but there are so many gratuities, that this gives no indication of the income of a jockey, which is often very large; £1,000 has frequently been given by a grateful owner. Racing has become popular in France, Russia, Austria, Prussia, Sardinia, and in the British colonies of India, Australia, the Cape, and Canada, and in the United States.

In addition to the flat-racing in England, there are a great number of steeple-chases, where horses contend over natural and artificial fences, ditches, etc. The sport is dangerous, on account of the immense speed arising from competition, so that horses get too distressed to jump, and broken backs and ribs are the consequence.

In the United States *trotting* is the prime favorite and oldest form of horse-racing; *steeple-chasing* and *hurdle-racing* have become popular since 1865; *placing-races* are growing in favor; and *double-team* contests, usually against time, with trotters, pacers, or one of each, harnessed to a four-wheeled buggy or road wagon, are privately indulged in by a few of the wealthiest horse fanciers of the country. A great impetus to the sport was given by the achievements of several American-bred horses on the English turf, 1865-82. The wonderful performances of Lorillard's *Iroquois* in winning the Derby and St. Leger, 1881, and Keene's *Foxhall* in capturing the Cesarewitch and Cambridgeshire stakes, opened the eyes of the sporting world to the great possibilities of the American-bred race-horse; and the products of our numerous breeding stables have been watched with keen interest. The history of the American turf is replete

with surprising records in every form of contest; and with few exceptions every year may be said to show an increase in the form, speed, and lasting qualities of the American racer, due to most painstaking breeding. Some of the recent best performances follow: RUNNING, dashes: 1 m.: *Salvator*, Monmouth Park (straight course), 1890, Aug. 28: 1.35½; 2 m.: *Judge Denny*, Oakland, Cal., 1898, Feb. 12: 3.26½; 3 m.: *Mamie Algol*, New Orleans, 1907, Feb. 16: 5.19; 4 m.: *Lucrezia Borgia*, Oakland, Cal., 1897, May 20: 7.11; shorter distances, ¼ m.: *Bob Wade*, Butte, Mont., 1890, Aug. 20: 0.21¼; ½ m.: *Geraldine*, Morris Park (straight course), 1889, Aug. 30: 0.46; ¾ m.: *Artful*, Morris Park, 1904, Oct. 15: 1.08. TROTTING: 1 m.: *Lou Dillon*, Memphis, Tenn., 1905, Oct. 24: 1.58½ (world's record, paced by runner to sulky carrying wind shield); 1 m. (team): *The Monk* and *Equity*, Memphis, Tenn., 1904, Oct. 21: 2.07¾; 1 m. to high-wheel sulky against time: *Major Delmar*, Memphis, Tenn., 1904, Oct. 26: 2.07; 2 m. (against time and paced by sulky with wind shield): *Cresceus*, Memphis, Tenn., 1902, Oct. 22: 4.17; 3 m.: *Nightingale*, Nashville, Tenn., 1893, Oct. 20: 6.55½; 4 m.: *Bertie R.* (paced), Blackpool, England, 1899, Sept. 11: 9.58; 5 m.: *Bishop Hero*, Oakland, Cal., 1893, Oct. 14: 12.30¾; best two heats: *Sweet Marie*, Syracuse, N. Y., 1906, Sept. 12: 2.04¾, 2.03¾; best three heats: *Cresceus*, Brighton Beach, N. Y., 1901, Aug. 15: 2.03¼, 2.06¼, 2.05; 1 m. to wagon against time (paced): *Lou Dillon*, Memphis, Tenn., 1903, Oct. 28: 2.00. PACING: 1 m.: *Dan Patch*, St. Paul, Minn., 1906, Sept. 8: 1.55 (world's record); 1 m. to high-wheel sulky, paced by runner to sulky with wind shield: *Dan Patch*, Macon, Ga., 1903, Nov. 30: 2.04¾; 1 m. against time to wagon: *Dan Patch*, Memphis, Tenn., 1903, Oct. 27: 1.57¼; 1 m. by team against time: *Direct Hal* and *Prince Direct*, Memphis, Tenn., 1902, Oct. 26: 2.05½; 2 m. against time and paced: *Dan Patch*, Macon, Ga., 1903, Nov. 30: 4.17; 3 m.: *Joe Jefferson*, Knoxville, Ia., 1891, Nov. 6: 7.33¼; 4 m.: *Joe Jefferson*, Knoxville, Ia., 1891, Nov. 13: 10.10; 5 m.: *Fisherman*, San Francisco, Cal., 1874, Dec. 19: 13.03½; best two heats: *Prince Alert*, Memphis, Tenn., 1901, Oct. 26: 2.02½, 2.00¾; best three heats: *Anaconda* and *Coney*, Detroit, Mich., 1901, July 17: 2.02, 2.02¾, 2.03½. In 1907 the Suburban (1¼ m.) was won by *Nealon:* 2.06⅖; the Brooklyn Handicap (1¼ m.) by *Superman:* 2.09; and the Futurity (6 fur.) by *Colin:* 1.11⅕ (record time for this race).

HORSE'-RADISH (*Armoracia*): genus of plants of nat. ord. *Cruciferæ*, differing from scurvy-grass (*Cochlearia*) chiefly in having the valves of the seed-pouches destitute of prominent nerves. The species are perennial herbaceous plants, having erect stems and white flowers, and roots remarkable for their pungency, which is owing to a volatile oil, of very powerful odor, believed identical with the volatile oil of mustard. The COMMON HORSE'-

RADISH (*A. rusticana*) has long cylindrical white roots, stems about two ft. high, large, much-veined, oblong, crenate root leaves on long stalks, and elongate-lanceolate stem-leaves. It is indigenous in e. Europe, whence it was probably introduced into western countries; grows in damp meadows, and is cultivated for its roots, which are scraped or grated down and mixed in salads, or used as a condiment with roast-beef and other flesh food. Horse-radish root is used also in medicine as a stimulant, and is an aid to digestion; it is also regarded as an antiscorbutic; and is sometimes applied externally as a rubefacient instead of mustard. In cultivation, the horse-radish is generally planted very deep. It is very difficult to eradicate it from ground in which it has become established, as almost any portion of the root will grow.—Another species, *A. macrocarpa,* native of Hungary and Transylvania, has much larger flowers, and a rather less pungent root.

HORSE-SHOEING. The foot of the wild horse is sufficiently protected from injury by a horny covering called the hoof. The wear to which it is subjected is constantly being repaired by the growth of new material. But when the horse is used for driving or working, the process of repair is much slower than the wearing down of the horn, and he soon becomes footsore and unable to travel. Consequently, it is necessary to protect the hoofs of horses which are to be of service to man. The exceptions to this rule are rare, and are found in horses with unusually strong hoofs, and those which are used only on soft ground and for light work. Protection is given by covering with a piece of iron, called a shoe, that portion of the hoof which would be otherwise exposed to wear.

Shoeing has been performed from an early period, and until quite recently has been done in a most unskilful manner. The work has usually been intrusted to uneducated men, who knew nothing of the anatomy of the horse's foot, and who fitted the hoofs and nailed on the shoes with as little care as they would have fastened pieces of iron to a log. The frog and sole have been pared down, and the crust torn off with a rasp. The shoe has then been made to fit by heating sufficiently to burn the hoof and holding it thereon until a level surface was obtained. It was fastened to the hoof, with large nails driven in the roughest manner. Under such a system, it is not strange that diseases of the horse's foot were frequent, severe, and extremely difficult to cure. Bad shoeing has probably spoiled more good horses than any other single cause of injury which is under the control of man. Navicular disease, laminities, founder, contracted hoofs, thrush, cracks, and various other ills may, in unnumbered cases, be traced to this source. Over-reaching, tripping, and stumbling, also are often caused, and always aggravated by improper shoeing. Of late much more attention has been given to the structure of the horse's foot, and

greatly improved methods of shoeing have been devised. The advocates of the new systems are divided into two main classes—those who hold that the frog should be placed on the ground and with the wall of the hoof should bear the weight of the horse, and those who believe that the frog should not be on a level with the surface of the shoe. Each party points to the excellent results of its shoeing as proof that its method is correct. The weight of shoes also has been materially reduced. It has been found that a heavy shoe, which keeps the frog from the ground, will wear out as soon as a light one that allows

A Sound Fore-Foot prepared for the Shoe.

A, A, the heels of the crust; B, the toe cut out to receive the clip; C, C, the quarters of the crust; D, D, the bars as they should be left, with the full frog between them; E, E, the angles between the heels and bars, where corn appear; F, F, the concave surface of the toe; G, G, the bulbous heels; H, the cleft.

the frog to touch the surface; that it is much more likely to come off and be lost, and that it greatly increases the labor of the horse in travelling. Light nails should always be used. They will hold the shoe as long as it ought to remain, and will not injure the hoof as much as large and heavy nails. As the shoe protects that part of the hoof which it covers, while the remainder is constantly wearing away, it becomes necessary to remove it occasionally, and by paring off the more rapidly growing part to bring the different portions into their proper relative positions. Some horses need more frequent shoeing than others, but the average is once every four or five weeks. Neither the frog nor the sole should be removed, and the wall of the hoof should be cut away only enough to take off its surplus growth. The rasp should never be used on the wall of the foot, either for making a groove in which to sink the nail clinches, or for the purpose of improving the

looks of the foot. The nails must not be too tightly driven, and in removing an old shoe, care is needed to prevent injury to the hoof.

The form of shoes, as well as the methods of shoeing, have been greatly improved in recent years. Special patterns have been devised for horses with feet of peculiar forms, or which were suffering from diseases which the ordinary shoes seemed to aggravate. In cases of spavin, as well as in diseases or injuries of the feet, great relief has been afforded by shoes made to relieve that particular trouble. Among the principal improved shoes used in this country are the Goodenough, named for its inventor; the four-calkin shoe of Robert Bonner; the rolling-ball shoe of Dr. David Roberge, and the wing-heeled centennial shoe of S. T. Harris.

HORSE-TAMING: subduing wild or vicious horses. Most horses are intelligent and docile animals, and if properly treated will never be troublesome. A few are naturally vicious, and a larger number become so by bad training. By skilful management during a course of training, and constant care afterward, a horse that has merely acquired vicious habits may be made serviceable and reasonably safe. A horse with a violent disposition may be tamed by a skilful trainer, but the vicious qualities will be liable to assert themselves whenever restraint is removed. Such horses should be kept only where the work is regular and severe, and they ought always to be regarded as dangerous animals. The man who attempts to tame a vicious horse must be gentle but unyielding. He must be vigilant and fearless, and must never lose his temper for an instant. In some cases he can subdue a vicious animal by passing a small rope around the upper jaw, crossing it in the mouth above the upper teeth, and tying the ends back of the neck. For violent animals the 'Rarey' method is probably the best which has been devised. The yard or floor where the horse is to be trained should be deeply covered with straw. A bridle and surcingle are put on, a strap or rope is noosed around the off fetlock, and the end passed through the surcingle under the horse. The left foot is raised nearly as high as the body, and strapped around the leg. The horse is kept on three feet until he is tired, when he is made to move. As he raises the fore foot the operator pulls it up with the rope, and holds it while the horse falls upon his knees. The horse is held in this position until he is exhausted and turns, or is easily rolled, upon his side. He is then petted and talked to, but is not allowed to raise his head. Under this treatment the horse will soon allow his feet and legs to be handled, and when permitted to rise will be perfectly gentle. A single lesson is usually sufficient, and it is claimed that three trainings will thoroughly and permanently subdue the most vicious animal. Though apparently a simple process, this method requires strength, skill, patience, and courage on the part of the operator.

Coolness and self-possession also are indispensable, not only to the success of the effort to subdue a really vicious horse, but, in a still greater degree, are essential to the safety of the man who makes the attempt.

HORSES, Trotting and Pacing. The harness racing horse has two gaits, namely, the trot and the pace. They were both originally the connecting link between the walk and the gallop, but by development and careful training have come to take the place of the latter so far as extreme speed in harness is concerned. The term 'diagonal gait' is applied to trotting because the horse employing it raises simultaneously a front and hind foot at opposite sides of the body. In pacing the front and hind feet on the same side move together, and this is best expressed as the 'lateral gait.'

HORSHAM, *hawrs'am:* a borough in the county of Sussex, is situated on a tributary of the Arun, 28 miles n.e. of Chichester, and 35 miles s.s.w. of London. The Court-house, a Gothic edifice; St. Mary's Church, in the Early English style; the Catholic Chapel; the Grammar-school; and the Corn Exchange, are the principal institutions of the town. Horsham is a borough by prescription, never having been incorporated. It returned two members of parliament from the 14th c. till 1832, and one after that time. Pop. 8,500.

HORSLEY, *hawrs'lĭ*, Samuel, d.d.: English prelate: 1733-1806, Oct. 4; b. at St. Martin's-in-the-Fields, London; son of a clergyman. He was educated at Westminster School and Trinity Hall, Cambridge, where, though he studied hard, and laid in immense stores of knowledge, he took no degree in arts. In 1758, he became curate to his father, then rector of Newington, and soon succeeded to the rectory, a living which he held 34 years, receiving in the interval many other preferments. In 1767, Horsley was elected a fellow of the Royal Soc. The writings that first brought him into notice were scientific, and not theological; e.g., *Remarks on the Observations made in the late Voyage towards the North Pole, for determining the Acceleration of the Pendulum in lat.* 79° 51′ (1774). Two years afterward, he issued proposals for a complete edition of the works of Sir Isaac Newton, which did not make its appearance till 1785. But the grand event in his career was his controversy with Dr. Priestley, which, considering the momentous nature of the subjects discussed, and the splendid talents of the combatants, may be pronounced the greatest theological contest of the 18th c. The impression made by the controversy was, and still remains, that so far as hard, merciless *hitting* goes, Horsley had decidedly the best of it. Rude in language, but panoplied in learning, contemptuous, defiant, dictatorial, his attitude reminds one of Goliath rather than of the apostle Paul, and suggests that he is, at least, as much inspired by the ambition of the pugilist as by the

ardor of the Christian. The tone, however, as of a complete and final wisdom, in Dr. Priestley's attack on ancient and treasured doctrines of the church—not unusual with those who deem themselves called to make an end of old corruptions—doubtless tended to give bitterness as well as force to Horsley's criticism. The work that excited the controversy was Dr. Priestley's *History of the Corruptions of Christianity,* among which corruptions was included the orthodox doctrine of Christ's uncreated divinity. Horsley reviewed the work with great severity in his charge delivered to the clergy of the archdeaconry of St. Albans, 1783, May 22. Priestley replied the same year in *Letters to Dr. Horsley in Answer to his Animadversions,* etc. In 1784, Horsley retorted in 17 *Letters from the Archdeacon of St. Albans in reply to Dr. Priestley,* etc. These were, in return, met by a new series from Priestley, who, waxing warm with the fight, describes his antagonist as 'the incorrigible dignitary.' After a silence of 18 months, Horsley again replied in *Remarks on Dr. Priestley's Second Letters,* etc., and in 1789 collected and published the whole that he had written on that subject. Both sides showed fierceness in fight; but Horsley brought more learning and ability for the discussion of the particular points in issue. Priestley's unusual and admirable gifts were in other departments. Horsley's services were rewarded with the bishopric of St. Davids 1788, whence he was translated to the bishopric of St. Asaph's 1802. As a bishop, he was liberal and humane both to the clergy and the poor of his diocese, though vigilant and strict in the discharge of his episcopal duties. His works, besides those above mentioned, consist of sermons and treatises on biblical criticism, on mathematics, and on classical subjects. A collected ed. of his theological works was published by Longman (6 vols. 1845).

HORT, *hawrt,* FENTON JOHN ANTHONY, D.D.: theologian: 1828, Apr. 23—1892, Nov. 30; b. Dublin, Ireland. He graduated at Trinity College, Cambridge, 1850; held a fellowship there 1852-57, and the college living of St. Ippolyts with Great Wymondley 1857-72; was elected fellow of Emmanuel College, Cambridge, 1872, and after serving seven years as Hulsean lecturer, was elected prof. of divinity 1878, remaining in that position till his death. He was examining chaplain to the bps. of Ely and Winchester, Lady Margaret's preacher, member of the boards of theol. and historical studies, and of the senate council of the Univ. of Cambridge. He contributed to the *Dictionary of Christian Biography* and *Journal of Philology,* published *On Monogenos Theos in Scripture and Tradition,* and *On the Constantinopolitan and other Eastern Creeds of the Fourth Century* (1876); and with Dr. Westcott edited a critically revised Greek text of the New Test. (1881).

HOR'TA. Seaport in Fayal (q.v.).

HORTATIVE, a. *hŏr'tă-tĭv*, or HOR'TATORY, a. *-tĕr-ĭ* [L. *hortatīvŭs*, that encourages or exhorts—from *hortor*, I strongly urge, I exhort]: giving or containing exhortation or advice; encouraging.

HORTENSE' (EUGENIE HORTENSE DE BEAUHARNAIS —known as La Reine Hortense), Queen of Holland. See BONAPARTE.

HORTENSIUS, *hawr-tĕn'shī-ŭs*, QUINTUS: B.C. 114-50; b. Rome: lawyer and orator. He was carefully educated, established his reputation as an advocate when 19 years old, married a daughter of Catullus, became a milit. tribune in the social war B.C. 91-90, defended Pompey when accused of embezzling public booty B.C. 86, was quæstor B.C. 81, ædile 75, præter urbanus 72, and consul 69. He opposed the supersedure of Lucullus by Pompey advocated by Cicero, defended Milo against Clodius, and soon after Pompey's return from the east B.C. 61 withdrew from public life and applied himself wholly to his profession. His career was parallel with that of Cicero, and for many years they were rivals as advocates and publicists. His private character was not without blemish; but he was kind-hearted, generous, and had few enemies.

HORTICULTURAL SOCIETIES: associations for the promotion of gardening and fruit-growing; intermediate between agricultural and pomological societies, but partaking of the nature of both. The first society of the kind was established in London in 1804, and was incorporated some four or five years later. An experimental garden occupying thirty-three acres was opened at Chiswick in 1822. The ground was obtained of the Duke of Devonshire, and the lease is 'renewable forever.' This garden is one of the finest of its kind in the world. The success of the London society led to the formation of similar associations on the Continent and in the United States which have proved of great value to the people at large. In this country nearly every state has its distinctively horticultural society, while large numbers of the county agricultural societies devote considerable attention to horticultural matters, and offer quite a proportion of their premiums for exhibitions in this line. The annual reports of these societies contain much valuable information regarding the newer varieties of vegetables, fruits, and flowers, the best methods of cultivation, and other matters of practical importance to the horticulturist and the farmer. Membership of these societies is increasing, and the work which they perform is assuming a greater degree of importance than it has had in the past. The varieties of vegetables and fruits have become so numerous that reliable information as to their special qualities and their value for general cultivation will save multitudes of growers from loss and disappointment. The increase of insect enemies also calls for intelligent and united effort for their suppression.

HORTICULTURE, n. *hŏr'tĭ-kŭl'tūr* [L. *hortus,* a garden; *cultūra,* cultivation]: art of cultivating gardens (see GARDENING); and in its broader sense including the growing of flowers (see FLORICULTURE) and the cultivation of fruits (see FRUIT—*Fruit Garden:* also ORCHARD). HORTICUL'TURAL, a. *-tū-răl,* pertaining to horticulture. HOR'TICUL'TURIST, n. *-rĭst,* one skilled in.

HORTON, *hawr'ton:* city in Brown co., Kan.; between Delaware and Missouri creeks, on the Colorado branch of the Chicago, Kansas and Nebraska railroad; 41 m. n.w. of St. Joseph, Mo. It was laid out 1886. The city contains several fine churches, good ward and high schools, national and state banks, public hall, railroad car and machine shops (plant cost more than $600,000), agricultural implement factory, for which the citizens subscribed $60,000, street railroad, water-works, and electric-light plants. Horton is in a rich agricultural country, and is an important shipping point. Pop. (1910 est.) 4,200.

HOR'TON, ROBERT FORMAN: English clergyman and author: b. London 1855, Sep. 18. He was educated at New College, Oxford, and in 1879 he was made a fellow of New College, and lecturer on history. In 1880 he became the pastor of the Congregational church at Hampstead, and in 1893 pastor of the Lyndhurst Road church there. In 1893 he delivered the Lyman Beecher lectures at Yale; in 1903 he was chairman of the Congregational Union of England and Wales. He wrote *History of the Romans* (1885); *Inspiration and the Bible* (1887); *The Teaching of Jesus* (1895); *Oliver Cromwell* (1897); *Women of the Old Testament* (1897); *The Commandments of Jesus* (1898); *England's Danger* (1898); *The Pastoral Epistles* (1901); *The Trinity* (1901); *The Bible as a Missionary Book* (1904), etc.

HORTON, SAMUEL DANA: American publicist: b. Pomeroy, Ohio, 1844, Jan. 16; d. Washington, D. C., 1895, Feb. 23. He was graduated from Harvard in 1864, and from the law school in 1868. He began the practice of law in Cincinnati, but devoted himself mainly to the study of monetary questions; he was one of the first to advocate the establishment and maintenance of an international ratio between gold and silver. He was secretary of the international monetary conference at Paris in 1871, and a delegate from the United States at the conference of 1881; shortly before his death he went to Washington at the request of the administration for a conference concerning the financial situation. He wrote *Silver and Gold and their Relation to the Problem of Resumption* (1876); *The Silver Pound and England's Monetary Policy Since the Restoration* (1887); *The History of the Guinea* (1887); *Silver in Europe* (1890).

HORTUS SICCUS, n. *hŏr'tŭs sĭk'kŭs* [L. *hortus,* a garden; *siccus,* dry]: a collection of specimens of plants dried and arranged; a herbarium.

HORUS, *hō'rŭs:* Egyptian god, whose name, *Har,* means 'the day,' or 'the sun's path,' and is generally written in hieroglyphics by the sparrow-hawk, which was sacred to him. The old derivation from the Hebrew *aur,* light, is now recognized as incorrect. Under the name H. were included several deities, as Haroeris, (q.v.), the Elder Horus; and Harpocrates (q.v.), or the Younger Horus; *Har-sam-ta,* Horus, the uniter of the upper and lower world, who was the second son of Athor, resided in Annu, or Heliopolis, and emanated from the eye of the sun (Rosellina, *M. d. c., t.* 47); and *Har-net-ta,* another form of the same god, represented as a boy wearing a triple crown, who existed from the commencement of things, a self-created being, and emanated from the Nu, or firmament; besides several others. But the principal H. was son of Isis (*Har-si-hesi*), represented as a naked child standing wearing a skull-cap, or the crown of Upper and Lower Egypt. H. is mentioned first by Herodotus (ii. 144, n. 156) as son of Isis and Osiris, and brother of Bubastis, the Egyptian Diana. Various accounts are given of his birth; he having been, according to one version, engendered of his father Osiris before the birth of Osiris and Isis; or, according to another account, begotten of Osiris after that god's destruction by Typhon. His birth was said to be premature, and he was consequently weak in his lower limbs. In order to avoid the persecution of Typhon, he was brought up in secret by Leto on the floating island of Chemmis, or Buto. Having grown up, he became *Har-net-atf* (H. the avenger of his father), and, with Isis, avenged his father's death (see OSIRIS); according to the best received tradition, vanquishing Typhon and his associates in a great battle at a village near the city of Antæus, on the 26th of the month Thoth, on which occasion Osiris came from the nether world to his assistance in the shape of a wolf (Diodor. i. 21). According to the Egyptian ritual, he cut off the heads of his foes for the fowls of heaven, and their thighs for the wild beasts and fishes. Typhon is said to have been delivered bound in fetters to Isis, who released him, on which H. tore the diadem off his mother's head, but Thoth replaced it by the head of a cow. H. was often confounded with the elder H. by the Greeks, but the monuments represent him as the type of royalty, the antagonist of Set or Typhon, the avenger of his father Osiris, for whom he obtained the corn of Elysium and the waters of Elephantine, conquered the north and south, and shared Egypt with Set or Typhon, having held the government of the northern portion as Typhon held that of the south. After the death of Typhon, he became sole monarch, and as last king of the dynasty of gods, reigned, according to different versions, 100 or 25 years. Numerous esoteric explanations have been given of this god, as that he represents the Nile, as Typhon represents the desert, the fruitful air or dew which revives the earth, the moon, the sun in relation to the changes of the year, or the god who presided over the course of the sun. He represented also three planets, Jupiter (*Harapshta*), Saturn (*Harka*), and

Mars (*Harteshr*). The sparrow-hawk was sacred to him; so were lions, which were placed at the side of his throne. There was a festival to celebrate his eyes on the 30th Epiphi, when the sun and moon, which they represented, were on the same right line with the earth. A movable feast, that of his coronation, is supposed to have been selected for the coronations of the kings of Egypt, who are described as sitting upon his throne. When adult, he is generally represented hawk-headed ; as a child, he is seen carried in his mother's arms, wearing the pschent or atf, and seated on a lotus-flower with his finger on his lips. He had an especial local worship at Edfou or Hut, the ancient Apollinopolis Magna, where he was identified with Ra, or the sun. There were also books of Horus and Isis, probably referring to his legend (Lucian *De Somn. sive Gall.* s. 183). The magnet was called his bone ; he was of fair complexion.—Birch, *Gall. of Antiq.* p. 35; Wilkinson, *Mann. and Cust.* IV. 395; Tablonski, *Panth.* II. 4, p. 222; Champollion, *Panth. Eg.;* Hincks, *Dubl. Uni. Mag* XXVIII. 187 ; Boeckh, *Manetho,* p. 61.

HO'RUS, King of Egypt, (named HAREMHEBI) : reigned at the close of the 18th dynasty. His reign has been placed at B.C. 1661, 1455, or 1446, but it was probably about B.C. 1400. Although the lists of Manetho give him a reign of 36 or 38 years, no earlier monumental date than his seventh year has been found. He restored the worship of Amen Ra, which had been overthrown by the disk or sun worshippers ; and conquered the Barubaru, a tribe of the negroes of Kush or Æthiopia. The most southern point where his monuments have been found is Gebel-Addeh, ancient Amen-Heri, between the Wady Halfa and Ibsamboul. He also embellished Luxor and other quarters of Thebes. Fine statues of this monarch are at Turin, and others in the British Museum.—Brugsch, *Geographie des Alten Ægyptens;* Champollion-Figeac, *L'Egypte,* p. 319.

HORVÁT, *hor'vât,* ISTVÁN (Stephen): the Hungarian Varro: 1784–1846; b. Stuhlweissenburg. From early youth through life H. gave his rare abilities to historical research, with the double object of settling the question as to the origin of the Magyars, and of consolidating Hungarian nationality through the scientific development of the Hungarian language. Among his published works, the chief merit belongs to *Magyarország Tösgyökeres Régi Newzetségeiröl* (Primitive Families of the Hungarians, Pesth 1820), an 8vo vol. of moderate size, but whose materials were gathered from innumerable rare manuscripts, and other documents, partly foreign, partly domestic. It is a monumental work in genealogy, connecting some of the living Hungarian families with the chieftains who came with Arpád at the end of the 8th c. In 1814, appeared at Pesth, *Defense of the Kings Lewis the Great and Mathias Corvinus;* in 1821, two vols. of *Answers to the Questions on Philology, put by the National Museum at Pesth;* in 1825, *Sketches from the Oldest History of the Hungarian Nation:*

in 1828,9, *Researches on Biblical Expressions*, etc. H. was for many years editor of, and later, chief contributor to the *Tudom ânyr Gyŭj temény*, or Scientific Magazine.

HOSACK, *hŏs'ak*, DAVID, M.D., LL.D., F.R.S.: 1769, Aug. 31—1835, Dec. 22; b. New York: scientist. He graduated at the College of New Jersey, 1789, and in medicine at the College of Philadelphia, 1791; studied two years in England and Scotland; became professor of natural history in Columbia College, 1795; was professor of materia medica and of botany there, 1797–1807; prof. of midwifery and surgery, of the theory and practice of medicine and obstetrics, and of the diseases of women and children in the College of Physicians and Surgeons, 1807–25; and prof. in the medical department of Rutgers Coll., 1825–30. He edited the *American Medical and Philosophical Monthly*, 1810–14; founded the first botanical garden in America; and was a founder and first pres. of the New York Hist. Soc. 1820–28. He was noted as botanist and surgeon, and published many technical works.

HOSANNA, int. n. *hō-zăn'nă* [Gr. *hōsan'na*—from Heb. *hoshiahnna*, save, I beseech you]: an invocation of blessings, which in Hebrew usage passed into an exclamation of praise to God as the giver of all salvation, and an acclamation of the grandest and most joyful public worship. At the feast of tabernacles, the Jews, carrying palm-branches and myrtle, repeated Ps. cxviii. 25, 26, which begins with Hosanna! The feast itself, especially its seventh day, was called the Great Hosanna.

HOSE, n. *hōz* [OF. *house*, a boot—from mid. L. *hosa:* Ger. *hosen;* Icel. *hosa;* Dut. *hose*, boots, leather casings: Bav. *hosen*, a pod, a husk: Dan. *hase*, the husk of nuts]: coverings for the legs; stockings; a flexible pipe for water. HOSE, or HOSEN, plu. *hō'zn*. HOSIER, n. *hō'zhėr*, or *hō'zhĭ-ėr*, a dealer in stockings, etc. HO'SIERY, n. *-zhėr-ĭ*, stockings in general (see below). HOSE-IN-HOSE, in *hort.*, having the calyx in the form of a corolla, so as to give the appearance of two corollas, one within the other.

HOSEA, *hō-zē'a*, BOOK OF: placed in the Hebrew Bible next after Ezekiel, consists of prophecies spoken (according to the superscription) in the days of Uzziah, Jotham, Ahaz, and Hezekiah, kings of Judah, and of Jereboam II., King of Israel—a period of about 60 years; B.C. 784–726. This portion of the history of Israel was one of apostasy from God, commenced by Jereboam, founder of the kingdom, and aggravated by the successive kings. Hosea's prophecies, uttered under such circumstances, may be divided into two parts. I. The first (ch. i.–iii.), under the symbol of a corrupted and unfaithful wife and her children, sets forth the displeasure of God against the sins of Israel; yet promises reconciliation and mercy, after a period of punishment during which the people would be led by calamity and sorrow to turn to the Lord as the only source of good. II. The second part repeats at greater length the denunciations against sin, the calls to repentance, and the promises of restoration and blessing. It has

been analyzed as containing a series of six discourses: The first (ch. iv.) denounces the corruption of the people, the rulers, and the priests; the second (v.-vi. 3) emphasizes the responsibility of the priesthood for the corruption of the people; declares that calamities would come on them notwithstanding their plans to obtain foreign help; and foretells their return, torn and smitten, to the Lord. The third (vi. 4—vii.) renews the charge against Israel as fickle, rebellious, and silly in seeking help from Assyria and Egypt, after all their bitter experience that such alliances brought calamity and ruin. The fourth (viii.-ix. 9) denounces once more the wilful and persistent guilt of the people, and declares again that the day of retribution is at hand. The fifth (ix. 10—xi. 11) affirms that in the three great periods of their history—in Egypt, the wilderness, and their own land—Israel had requited God's loving-kindness by turning to idolatry. But, notwithstanding all this, the Lord declares that he cannot give them up as he is God and not man, the Holy One in the midst of them. The sixth (xii.-xiv.) closes the book with a renewed exhortation to repentance and a renewed promise of restoration to the favor of God: 'Take with you words and return to the Lord; I will heal their backslidings.' Hosea's mind, it has been said, was greatly agitated under the burden of preaching against the sins of his people, and of announcing their consequent doom. Hence his abrupt style, disconnected sentences, and undeveloped figures of speech. Combined, however, with the dark exhibition of the divine displeasure against sin which the book contains, there is also the light of reconciling love shining on the corrupted people. In this combination lies the prophet's peculiar power.

HOSHANGÁBÁD, or HOSHUNGABAD, *hō-shŭng-â-bâd′*: town in Central India, on the left or s. bank of the Nerbudda, which here divides British territory from Bhopal. It is a town of considerable commercial importance, cap. of a dist. of the same name in the Central Provinces. Pop. of town, 12,000. The district of Hoshangábád has 4,437 sq. m.; is so fertile as to be styled the garden of the country, and possesses abundance of excellent coal. Pop. 488,787.

HO′SIERY: in its most limited sense, stockings (hose); but in its more general application, all knitted goods made by hand or by machinery. The use of stockings originated in the cold countries of the north, and probably the first were of skins, and subsequently of cloth; they were also, until a comparatively late period, made all in one piece with the trousers, constituting the trunk-hose of our ancestors; but these garments were separated; and the art of knitting was invented, it is supposed in Scotland, about the beginning of the 16th c. Certain it is that knitted stockings found their way to France from Scotland, and led to the establishment of a

guild of stocking-knitters, who chose for their patron saint St. Fiacre of Scotland. In 1589, William Lee, of Woodbridge, Nottinghamshire, entirely altered the hosiery trade, by inventing the knitting frame; and though he did not live to receive much benefit from it, it soon became a very important aid to the commerce of Britain. During the Protectorate, the stocking-frame knitters obtained a charter, and extended their operations through the provinces of England, but with all the disadvantages of a monopoly, which eventually led to legal proceedings, by which the charter was set aside, 1753. Since that time, many improvements have been made in the stocking-frames, and a large proportion of the stockings now worn through the world are made by the manufacturers of Great Britain. (See STOCKING-FRAME.) Stockings are of cotton, of worsted, or of cotton and worsted mixed, called Angola, and of silk. From each material they are made of two distinct kinds. The best are made in a flat web, which has to be sewn at the back as well as the foot, and it is so made that when the two edges are brought together at the back, they give the form of a calf. The common or *racked* stockings are woven in a circular frame, and form a cylindrical web of equal width from top to bottom; these have to be stretched on boards to give them the shape, and are ironed with hot irons while on the board, to make them retain the shape of the board. The foot is formed by cutting the web and adding a small piece for the sole. Nottinghamshire, which gave birth to the inventor of the stocking-frame, is still the centre of the hosiery trade in Great Britain.

HOSIUS, *hō'sĭ-ŭs* (or OSIUS), THE SAINT: Bishop of Cordova: about A.D. 256-359; b. in Spain or Egypt. Of his early life nothing is positively known. He became bishop of Cordova about 296, came near losing his life during the Maximinian persecution 303-305, was conspicuous in the Council of Iliberi, 306, had established intimate relations with Constantine the Great 313; was sent by the emperor to Alexandria to reconcile the differences between Alexander the bishop and Arius his deacon 323, is believed to have procured the convening of the Council of Nice, of which he was a member, and, some say, pres. 325, and, whether or not the author of the creed there adopted, influenced Constantine to ratify it. In 347, he presided at the Council of Sardica, which showed extreme hostility to Arianism, and after its close became an open and active supporter of his friend Athanasius. Constantine commanded him to oppose the Athanasian doctrines, 355, and on his refusal banished him to Sirmium, where after passing his 100th year he was induced to take communion with the Arians 357. He was then recalled to Cordova, but to his dying hour refused to condemn Athanasius.

HOSMER, *hŏz'mėr*, HARRIET: sculptor; b. Watertown, Mass., 1830, Oct. 9; d. 1908, Feb. 21. Having a feeble con-

stitution, her father encouraged her to strengthen it by outdoor exercises, and she became an adept in shooting, riding, rowing, skating, and swimming. She also showed a talent for sculpture by modelling figures in clay. To prepare herself for her chosen career, she studied anatomy, first with her father, afterward at the medical college at St. Louis. Returning to her home, 1851, she modelled her first work, *Hesper*, which had so decided a success that she was sent to Rome, where she became the pupil of Gibson. In his studio, she modelled busts of *Daphne* and *Medusa*, and a statue of *Œnone* and the much admired statue of *Beatrice Cenci* for the Mercantile Library of St. Louis. Some 30 copies of her statue of *Puck* were ordered from her shortly after its completion. Her most ambitious work is a colossal statue of *Zenobia in Chains*. The *Sleeping Faun* is one of her best works.

HOSMER, JAMES KENDALL: American librarian and biographer; b. Northfield, Mass., 1834, Jan. 29. He was a professor in Antioch College, Ohio, and the University of Missouri, in 1874-92, was professor of English and German literature in Washington University (St. Louis, Mo.), and from 1892-1904 was librarian of the Minneapolis public library. Among his works are: *The Color Guard* (1864), a record of experiences as a private in the Civil War; *The Thinking Bayonet* (1865), a novel; *History of German Literature* (1879); *Life of Samuel Adams* (1885); *Life of Sir Henry Vane* (1888); *A Short History of Anglo-Saxon Freedom* (1890); *How Thankful was Bewitched* (1894); a *Life of Thomas Hutchinson* (1896); *History of the Louisiana Purchase* (1902); etc.

HOSPICE, n. *hŏs'pēs* or *hŏs-pēs'* [F. *hospice*, a hospital—from L. *hospĭtĭŭm*—from L. *hospĕs*, a guest]: establishment for sheltering travellers, maintained by monastic persons, usually in connection with monasteries.

HOSPITABLE, a. *hŏs'pĭ-tă-bl* [F. *hospitable*—from L. *hospĭtālĭs*, hospitable, friendly—from *hospĕs*, a guest, a visitor: It. *ospitabile*, hospitable]: receiving and entertaining friends or strangers with generous kindness; offering kind reception; proceeding from or indicating kindness. HOS'PITABLY, ad. *-tă-blĭ*. HOS'PITABLENESS, n. *-bl-nĕs*, disposition to entertain others, and do them kind acts, according to ability, especially to strangers.

HOSPITAL, n. *hŏs'pĭ-tăl* [OF. *hospital*—from mid. L. *hospĭtālĕ*, a large house or palace—from L. *hospĕs*, a guest, a visitor]: a house for the reception and aid of the sick, infirm, or poor (see HOSPITALS). HOSPITAL, in *English law*, eleemosynary corporation founded for supporting certain descriptions of persons. In Scotch law, it more frequently signifies a mortification or endowment for the education as well as support of children. HOS'PITAL'ITY, n. *-tăl'ĭ-tĭ*, kindness and generosity to strangers or guests. HOS'PITALLER, n. *-lĕr* [F. *hospitalier*]: in the

middle ages, one of a body of men at Jerusalem who devoted themselves to protect pilgrims and relieve their necessities—so called from two hospitals erected there for that purpose—from whom sprang the order of the Knights of St. John of Jerusalem, subsequently known as the Knights of Malta. Such charitable brotherhoods have been founded at various times and in different countries, for the care of the sick in hospitals. The vow to devote themselves to this work of mercy is, in all these brotherhoods, superadded to the ordinary vows of poverty, chastity, and obedience common to all the religious orders in the Church of Rome. One of the earliest recorded instances of a hospital served by such a brotherhood is that of Constance in 13th c. (See ST. JOHN OF JERUSALEM, KNIGHTS OF; TEUTONIC KNIGHTS.) The hospitallers of Our Lady of Christian Charity were founded near Chalons in the end of the 13th c. by Guy de Joinville; a similar body at Paris 1294; and the hospitallers of Our Lady Della Scala about the same time at Siena. There are many other local institutes or congregations. HOSPITALISM, n. *hŏs'pĭt-ăl-ĭzm*, the prejudicial influences of large hospital buildings upon sick residents, especially when the patients are numerous; the subject of hospital construction. DAMES OF THE HOSPITAL: see SISTERS OF CHARITY.

HOS'PITALS: institutions for medical treatment or care of the sick or injured or infirm, especially for the poor. The mediæval *hospitia* in some cases were hospitals for the reception and relief of lepers, whose malady was one of the scourges of Europe. These leper hospitals in England and Scotland were often called 'Spitals'; hence the frequency of such names of places as Spital, Spitalfields, etc. The leper hospitals and other kinds of the old hospitia disappeared with the improvement of society, and substitutes for them on a broader scale began to be established in the modern form of hospitals. Of public establishments under this general designation, there are now several distinct classes—e.g., hospitals for the reception and treatment of the sick and hurt, for the board and education of children, and for the reception and permanent board of poor old persons of both sexes. Hospitals of these several classes are numerous and on a munificent scale in Great Britain and in the United States—taking the position of leading charities. For some of the more remarkable hospitals see their respective titles.

Hospitals for the sick and hurt, sometimes termed Infirmaries, are now established in all parts of the civilized world supported, as in England, on a principle of charity, or, as in France, chiefly from the funds of the state or the civic municipalities, or as in the United States by both methods, the basis and main reliance, however, being usually municipal or civic. They are indispensable as a refuge to all who are unable to pay for private medical

or surgical aid, or as a convenient means of succor on emergencies to persons of every degree of opulence. In numerous instances they are serviceable also as schools for medicine and surgery; as such, no university, at which these and kindred branches of learning are taught, can be said to be complete without the adjunct of a well-organized hospital, where professors can practically educate their pupils by pointing out varieties of disease and injuries, and exemplifying methods of treatment. Hence, the best specimens of hospitals are found in university towns, or in towns famed for schools of medicine and surgery. The older of the London hospitals are, St. Thomas's, 1553; St. Bartholomew's, 1546; and Bethlehem, 1547. A considerable accession to the number took place in the reign of George II.; when society became alive to the value of such institutions. It was at this period that the Royal Infirmary of Edinburgh was established (1736). The antiquity of British hospitals sinks into insignificance in comparison with that of some institutions of this kind on the continent. The Hôtel Dieu in Paris, alleged to be the most ancient hospital in Europe, was founded in the 7th c., and long known as the Maison Dieu, received the benefactions of successive sovereigns. It is now conducted on a stupendous scale. Houses of this kind in France usually receive valuable aid from a religious sisterhood, renowned for its practical benevolence, the Sisters of Mercy. A striking example of these women's unselfish and useful labors is furnished at the great hospital for the sick and hurt at Lyons, where the entire establishment—cooking, nursing, dispensing medicine, etc.—is gratuitously conducted by them.

In London, Paris, New York, and very many other large seats of population, the pressure for admission by patients, and the necessity for classifying and properly attending to large numbers, have led to the establishment of hospitals for special departments of medical practice. Thus, besides the general hospitals, there are now lying-in hospitals, ophthalmic hospitals, consumptive hospitals, children's hospitals, etc., each with its peculiar accommodation; and its appropriate staff of officials. Independently of these, there are hospitals for treatment of mental maladies, of which Bethlehem and St. Luke's in London, and the establishments in Paris, known as Hospices, are examples. To this class of institutions belong Lunatic Asylums (q.v.), also asylums for the reception and treatment of naturally imbecile children. To all these institutions under civic administration, are to be added those hospitals maintained by various governments for the military and naval services.

Not the least among the benefits of hospitals to a community, is the fact that, by their prompt and liberal action, they interpose to check contagious distempers which, if unchecked on their outbreak, might invade families far

above the need of gratuitous medical attendance. On this ground, as well as from sentiments of benevolence, hospitals or infirmaries are the objects of solicitude to the general community; it being customary for wealthy individuals to bequeath sums toward their support, and for public subscriptions and church collections to be made for them annually. In some cases, besides the infirmaries so miscellaneously sustained, hospitals are erected and maintained wholly by endowment.

Internally, a hospital building is usually arranged in wards, each under its own nurses, with general superintendents, and a suitable body of servants. Being open night and day to receive pressing cases, there is a resident surgeon with assistants constantly in attendance. Scrupulous cleanliness, quiet, decorous conduct, exclusion of intoxicants and of miscellaneous visitors, are among points principally attended to by the managers.

While in the main the hospitals recently planned or erected in the United States follow what is known as the parallelogram form, advantage has been taken of the latest discoveries in sanitary science, and the distinguishing novelties are found in improved methods of lighting, draining, ventilating, and plumbing. Municipal legislation and private charity have added largely to the number of these grand institutions through the country within recent years. All are deserving of the warmest commendation; but without attempting any invidious distinctions, attention is directed to the institutions whose novelty and extent entitle them to particular notice. The first is the New York Cancer Hospital, on 8th ave. near Central Park, founded by the wives of John Jacob Astor and Gen. George W. Cullom. This is distinguished from all others on account of being the first building of its character in the United States erected on the circular ward plan, observed in the great Stuyvenberg Hospital in Antwerp, Miller Memorial Hospital in Greenwich, England, and Hampstead Hospital, England. The institution was projected about the time of Gen. Grant's fatal illness, and one pavilion built by Mrs. Astor for women alone was opened 1887, Dec. 7. A year later Mr. Astor began the erection of a second pavilion, for men only, as a memorial to his wife, who had died in the meantime, the total Astor gifts amounting to $300,000. The wards are uniformly 40 ft. in diameter, with accommodations for 13 patients each; are lighted on two-thirds their wall surface; and ventilated by openings in the exterior walls between the windows, as well as by a hollow iron column in the centre of each apartment connected with a powerful fan in the cellar. The absence of angles and corners promotes cleanliness, and the radiate arrangement of beds facilitates the work of the nurses by permitting more space between the heads of the beds, and is said to render the apartments far more cheerful than those constructed on the parallelogram form. The kitchen and

dining-rooms are on the top floor, and the hospital is provided with the usual administrative offices, operating theatre and nurses' quarters, together with a pretty chapel. Thus far nothing but praise of the institution and its arrangement has been heard; the enterprise is yet too young to yield results that will demonstrate the truth or falsity of the opinion held by many American physicians, that a circular sick room, from the monotony of its walls, exerts such a depressing influence on the minds of the patients that curative treatment is retarded and derangement liable to occur.

The second noticeable institution is the Johns Hopkins Hospital in Baltimore, opened 1889, May 7, which is the largest, most richly endowed and completely equipped hospital in the United States, and probably in the world. A few months before his death 1873, Johns Hopkins (q.v.) gave property valued at $4,500,000 to a board of trustees with which to erect a hospital for free treatment of the indigent sick and injured of the city and state irrespective of age, sex, or color. The trustees inclosed and beautified 14½ acres of ground of his estate, and erected thereon 17 buildings which with their furniture and accessories cost $2,050,000. Through prudent management of the trust, this result was accomplished without taking a dollar from the principal of the endowment. The trustees anticipating some of the possibilities of so vast an institution, decided to extend its usefulness beyond the limits proposed by its founder, and accordingly provided for the reception of such persons as were able to pay for the superior treatment that the institution would afford, the training of nurses, the education of physicians and surgeons, and the publication of technical monographs on cases of general professional interest. When completed the institution will comprise 25 buildings, nearly all of Baltimore pressed brick, Cheat river stone trimmings, and iron.

In some degree allied or auxiliary to hospitals are two kinds of establishments. The first are public *Dispensaries*, where, at stated hours, medical advice and medicines are given gratis to applicants; and though like other forms of charity liable to abuse, it is allowed that these institutions are of much value in poor communities, and also like hospitals are efficient in staying the course of contagious distempers. The other institutions referred to are those called in France *Maisons de Santé*—private hospitals for reception and treatment of patients who are able and disposed to pay a small sum for board and medical or surgical attendance. A common charge in France is from three to five francs a day. Under the name of *Sanatorium* this kind of institution has been introduced into England; and more extensively into the United States, where they are of various degrees of size and elaborateness.

Hospitals for the board and education of the young are

more varied in character and more numerous in Great Britain than in any other country in the world. Consisting mostly of large and handsome buildings, in salubrious situations in the environs of cities, some are specially adapted for boys, some for girls, less frequently for both; some are maintained by endowments from deceased benefactors, some by funds connected with trade incorporations, and some by casual donations and subscriptions. The oldest, and those on the most munificent scale, are for boys; e.g., Christ's Hospital, London; Heriot's Hospital, Edinburgh; and Donaldson's Hospital, Edinburgh. To this class belongs likewise the Girard College, Philadelphia, which costing for construction nearly two millions of dollars, and giving accommodations to more than 300 orphans, is not excelled in architectural grandeur, or in munificence of private endowment, by any European hospital for children.

Hospitals for indigent old men and women are found in several European countries, but nowhere are they so common as in Great Britain and the Netherlands. The workhouses for the reception of parish paupers are the humblest variety of these hospitia, though as seen in parts of England and Scotland, they are on a vast scale of accommodation, adapted to the wants of unions or clusters of parishes. Considerably above these in point of comfort and liberality of management, are the hospitals endowed by individuals or by incorporations for persons who once occupied a respectable position, and have through misfortune lapsed into decayed circumstances. Almost every city of any note in the United Kingdom has one or more of this species of hospitals; the claim for admission being ordinarily a privilege of local burgesses or members of incorporated crafts. In the United States almost every city of size has such institutions, often supported by charitable gifts and subscriptions; they are usually called Retreats, Homes, or Asylums. Analogous to this class of institutions was Greenwich Hospital for superannuated mariners connected with the Royal Navy, and the Military Hospital, Chelsea. In England there are numerous establishments called Almshouses, which are of the nature of hospitals for indigent men and women of respectable character, but with this difference, that instead of all living in wards under one roof, the inmates are provided each with a small dwelling, each receiving the means of separate livelihood therein. These establishments, consisting of clusters of neat small cottages in contiguity, or of separate dwellings grouped in the form of a spacious building, abound in London and its vicinity. At St. Cross, near Winchester, and at Coventry, are Almshouses curious from their antiquity and external appearance. The noblest example of this class of institutions is the Charter House, London (see CHARTER-HOUSE). In the United States, Almhouses are provided frequently by the counties, sometimes by cities and

towns, and are numerous: they are seldom called hospitals unless they are for the sick or the injured: but many of them have hospitals attached.

HOS'PITALS, MILITARY: establishments for the reception of the sick and wounded of an army. The smallest is the Regimental Hospital, under the medical officers of the regiment; next, is the Division Hospital, presided over by staff medical officers, for the benefit of all the corps in the division; lastly, there is the General Hospital, applicable to the whole force. In the United States, with its very small and scattered army, there are two permanent military hospitals—one for cadets at West Point, the other at Washington. The other hospitals are post-hospitals—small temporary wooden structures, holding 12 to 24 beds, and built to last 10 years. In these hospitals, the medical officers are responsible to the war department for all purely medical functions. With regard to discipline, inspections, and other military duties, the principal medical officer is responsible to the commandant of the regiment or division, who in his turn is answerable to the commander-in-chief for the state of the hospitals in his command.

During the civil war in the United States, 12,155 physicians entered the medical service of the federal govt. From 1861, May, till 1866, June 30, over 5,825,000 cases were treated on the field and in the hospital, of which 273,175 were from wounds received in action. In 1865, Jan., there were more than 200 general hospitals of large extent, 4 sea-going hospital transports equipped with stores and supplies for 5,000 patients, a large number of river steamers and railroad trains fitted up for hospital purposes, and hospitals for each army, milit. camp, corps, and post in the service. In the early part of the war any convenient building at scenes of actions was taken for a hospital; and as the number of convalescents increased, large buildings, such as factories, in cities accessible by rail or water from the field hospitals, were hired and fitted up by the govt. These constituted the general hospitals of the service. The base hospitals of the large armies were constructed either of continuous A or 4x4 canvas tents, of rough log-sided pavilions with fly tops, or of all-wood pavilions; the wards in general radiating from a common centre like the spokes of a wheel, though the local exigencies of the service usually determined the character and style of construction. The Hicks Hospital near Baltimore, on the wheel plan with administration buildings in the centre; The U.S.A. General Hospital at W. Philadelphia, nearly a parallelogram in shape; and the Lincoln Hospital at Washington, D.C., *en échelon* in a triangle, were types of large general hospitals, constructed comparatively at leisure, and with all practical regard for the comfort of the inmates. A one-story structure with wards 25 ft. wide, 14-16 ft. high, and of sufficient length to accommodate 32 beds with

100-120 sq. ft. of floor space to each, with windows opposite each other e. and w. and a hard-wood floor, is a favorite form and size among experienced physicians and surgeons, and the one generally adopted by the medical bureau of the war dept. in sudden epidemics.

HOSPITALS, NAVAL: in general, establishments for the reception of sick or wounded seamen, served by naval medical officers. In the United States the term is correctly applied only to the hospitals at or near the navy yards at Brooklyn, Philadelphia, Boston, Washington, Norfolk, and San Francisco, and the establishment maintained by the U. S. govt. at Yokohama, Japan. These all are served by the medical corps of the navy dept. Their operations are small in comparison with the necessities of seamen as a class, being almost wholly confined to the officers and men of the U. S. navy. A separate institution is provided for seamen of the mercantile marine, which cares for sick and disabled seamen of American vessels, and, under light conditions, those belonging to foreign ships. This is officially known as the U. S. marine hospital service, was established by act of congress 1798, July 16, and forms a distinct bureau of the treas. dept., with a corps of physicians and surgeons independent of regular naval or other control. Hospitals are established at the chief customs ports; and the service is maintained by a tax of 40 cents per man per month levied on the seamen of all American vessels, payments by sailors from foreign ships when admitted on the order of their consuls or captains ($1 per day), and deficiency appropriations by the federal govt. In a single year this service has received the prescribed contributions from 170,000 American sailors, treated 20,922 in its various hospitals, and furnished medicine to nearly 10,000 outpatients, or sailors not sick enough for attendance in the hospitals. The surgeons of the service, on the application of the master, owner, or agent of any vessel of the United States, are required to examine physically any person desiring to ship on board of any such vessel, in order to determine his seaworthiness; and the board of supervising inspectors of the U. S. steamboat inspection service require that no pilot shall be allowed to take out a license till he shall produce a certificate of examination from a medical officer of the U. S. Marine Hospital Service that he suffers from no defect of vision.

HOSPODAR, n. *hŏs′pō-dâr* [Boh. *hospodar*, host, landlord; *hospod*, lord: Russ. *gospodarj*, a lord or master]: In *Moldavia* and *Wallachia*, formerly a governor, chief, or prince under the Sultan of Turkey: now the Prince of Roumania is known under the native Romanic title *Domnu*. Another Slavonic term, *wojewod*, also was often given to the Hospodar, the term wojewod signifying the right and dignity of leading the army (thus identical with duke), while hospodar (gospodar, gospod, gospodin, in the various Slavonic dialects) means simply, master

(dominus). Formerly, the Lithuanian princes likewise were called *hospodars,* and the Polish kings till the time of Sobieski, assumed this title in their diplomatic negotiations with Russia. *Gosudar* (ruler, monarch) is even now the title of the emperor of Russia, and in conversation signifies master.

HOST, n. *hōst* [OF. *hoste;* F. *hôte,* a landlord, a guest —from L. *hospĭtem,* a guest, a stranger: comp. Gael. *osda,* an entertainer, a receiver of guests]: one who entertains a friend or stranger at his own house; the landlord of an inn: v. in *OE.,* to give entertainment to another; to live at an inn or hostel. HOST'ING, imp. HOST'ED, pp. HOST'ESS, n. [OF. *hostesse*]: a woman who gives entertainment.

HOST, n. *hōst* [OF. *host,* an army: a contr. of the mid. L. phrase *bannīrĕ in hostem,* to order out against the enemy—thus, in mid. L. *hostis* first signified the enemy, then the military service itself, and finally the army on duty]: an army; any great number or multitude. HOST'ING, n. in *OE.,* a muster of armed men; a hostile encounter. TO RECKON WITHOUT YOUR HOST, in any proposal or scheme not to take into account opposing or adverse elements; or, in living in a *hotel,* to take no account of extras in calculating the expenses which the *host* may charge: see HOST 1 and Wedgwood.

HOST, n. *hōst* [F. *hostie,* the consecrated wafer—from L. *hostĭă,* a victim or sacrifice]: in the *R. Cath. Chh.,* the consecrated wafer or bread of the Eucharist—called by that Church, when used, the sacrifice of the Mass. It is so called in conformity with the doctrine that the Eucharist is a 'sacrifice' in the strict sense of the word. The host in the Latin Church is a thin circular disk of unleavened bread, made of the finest flour, and generally bearing some emblematic device, as the Crucifixion, the Lamb, or some words or initials of words having reference to the sacrifice. In the Greek and other Oriental churches, as well as in the various Protestant communities, the Eucharist is celebrated in leavened bread, differing from ordinary bread only in being of finer quality; and one of the grounds of separation from the West alleged by Michael Cerularius was the western practice of using unleavened bread. The Greek and Prot. controversialists allege that, in the early church, ordinary or leavened bread was always used, and that our Lord himself, at the Last Supper, employed the same. Even the learned Cardinal Bona, and the Jesuit Sirmond, are of the same opinion; but most Roman divines, with the great Mabillon at their head, contend for the antiquity of the use of unleavened bread, and especially for its conformity with the institution of our Lord, inasmuch as at the paschal supper, at which 'he took bread, and blessed, and brake it,' none other than the unleavened was admissible (Exod. xii. 8, 15; Levit. xxiii. 5). See Klee's *Dogmatik,* iii. 190.

Elevation of the Host.—In the fourth part of the celebration of the sacrifice of the mass in Rom. Cath. Churches, immediately after the consecration of the bread and the utterance of the words 'This is my body,' the officiating priest kneels a moment in prayer, then rising and facing the congregation, raises the host above his head that all present may adore it. The same act is performed with the cup at the words 'This is my blood.' At both elevations a small bell is rung by an altar attendant, and in many religious establishments and churches a large bell is struck three times, that the sick and those otherwise detained from the service may be informed of the moment of the elevations. In the Greek liturgies the elevation of the eucharist takes place shortly before the communion, and in former times the Latin priests elevated only at the words *omnis honor et gloria* just before the *Paternoster.* The present moment of elevation (immediately after consecration) was prescribed about 1100 as a protest against the denial of transubstantiation by Berengarius, and the ringing of the bells was first introduced in the 12th c. in France.

HÖST, *höst,* JENS KRAGH: 1772, Sep. 15—1844, Mar. 26; b. St. Thomas: Danish historian. The great aim of his literary career was to create a conviction of unity among the Scandinavian nations. With this view, he established, in company with Nyerup, Pram, and Baggesen, the Scandinavian Literary Soc. which originated the journal *Scandinavian Museum.* His most important work is *Count Struensee and his Ministry* (3 vols., Copenh. 1824), the first attempt to delineate, in a thoroughly impartial manner, the events of that singular period in Danish history. Among his writings are: *Svenske Blade; Euphrosyne; Dannora; A Swedish Grammar and Dictionary for Danes; Lectures on the Swedish Language and Poetry; Life and Government of Gustavus Adolphus; Memorials of the Life and Government of Christian VII.*

HOSTAGE, n. *hŏs'tāj* [OF. *ostage* or *hostage*—from mid. L. *obstāgĭă* and *obstātĭcus,* a hostage—from L. *obsĭdātus,* the act of being made a hostage, or the condition of one—from *obses,* the one staying or remaining in a place, a hostage]: person left in the hands of an enemy as a pledge for the performance of the terms of an agreement. One given in pledge for the performance of conditions. When a town capitulates, victors and vanquished usually give into the custody, one of the other, several officers, as pledges that each party will duly carry out the terms stipulated. When the terms are fulfilled, the hostages are exchanged; but if the terms be evaded, the opposite side holds the right to put to death, or otherwise punish the hostages in its possession. In modern civilized warfare, the circumstances would have to be very remarkable indeed to be held to justify execution of a hostage.

HOSTEL, n. *hŏs'tĕl*, and HOSTELRY, n. *hŏs'tĕl-rĭ* [OF. *hostel*, an inn—from mid. L. *hospĭtālĕ* (see HOST 1, HOSPITABLE, and HOTEL)]: an inn; a public lodging and boarding house. HOSTEL is now spelled HOTEL, and HOSTLER spelled OSTLER.

HOSTESS, n. fem. See under HOST.

HOSTILE, a. *hŏs'tĭl* [F. *hostile*—from L. *hostīlis*, hostile—from *hostis*, an enemy]: adverse; unfriendly. HOS'TILELY, ad. *-lĭ*. HOSTIL'ITY, n. *-tĭl'ĭ-tĭ* [F. *hostilité*]: open warfare; attacks of an enemy; violence or animosity. SYN. of 'hostile': contrary; opposite; inimical; repugnant; adverse; warlike; malevolent;—of 'hostility'; animosity; enmity; opposition; violence; aggression.

HOSTLER, or OSTLER, n. *ŏs'lĕr* [F. *hostel* or *hôtel*, a lodging, an inn, a residence: OF. *hostelier*, an innkeeper: comp. Gael. *osd*, an inn; *osdair*, an innkeeper]: a man who has the care of horses at an inn or hotel.

HOT, a. *hŏt* [Dut. *heet;* Icel. *heitr;* AS. *hât*, hot: from HEAT, which see]: having much heat; fiery, as temper; violent; furious; biting; pungent in taste. HOTLY, ad. *-lĭ*, in a hot manner; vehemently; passionately; lustfully. HOT'NESS, n. *-nĕs*. HOT BATH, a bath of hot water or of vapor. HOT-BLOODED, having a quick temper; irritable. HOT-BRAINED, *-brānd*, violent; rash. HOT-HEADED, violently forward; unrestrained in passion; vehemently impulsive. HOTHOUSE, n. a building covered with glass and heated, for rearing plants. HOTBED, n. any place favorable to rapid growth. HOT-BLAST, heated air blown into a furnace for smelting ore. To HOT-PRESS, to apply heat with pressure, in order to give a smooth and glossy surface. HOT-PRESSING, the mode of giving a glossy appearance to paper, linen, etc., by heat and pressure. HOTSPUR, n. *-spĕr* [*hot*, and *spur*]: a violent, passionate, and heady man. HOT-CROSS-BUNS, on Good Friday, small light cakes prepared for sale by bakers and pastry-cooks, having on them the figure of the cross in commemoration of Christ's death. TOO HOT FOR HIM, the surroundings made so disagreeable and intolerable as to necessitate a departure or retreat. IN HOT HASTE, in violent or unusual haste.—SYN. of 'hot'; warm; burning; glowing; eager; ardent; keen; scorching; fervid; brisk; animated; precipitate; vehement; exciting; exasperated; lewd; lecherous; acrid; stimulating; pungent; dangerous.

HOT-AIR ENGINE. See CALORIC ENGINE.

HOT'BED: heap of fermenting matter, covered with a layer of earth, and usually surmounted with a frame, for cultivation of plants which require more than the natural heat of the climate and season, but not so much as to render the hothouse necessary. The heat is the result of fermentation. Hotbeds not being expensive, are in general use; as for growing melons, and for raising ornamental plants from seed in spring, to be planted in

the open ground as summer advances. The material mostly used is stable-dung, or a mixture of horse-dung and litter; but tanners' bark, leaves, the waste of flax, cotton or woolen factories, etc., are sometimes substituted for it. The heat of a very rapid fermentation being too great, it is necessary that this be over before the hotbed is planted; and it is usual, on this account, to prepare the materials some time before it is formed. A hotbed is made highest at the back, sloping—in the northern hemisphere—toward the south. The bed extends on all sides six inches or thereby beyond the frame, which has a movable glass sash or sashes, according to its size. The thickness of the hotbed, and of the earth upon it, are accommodated to the purpose intended, and the degree of heat required. When the heat decreases, it is for some purposes necessary to keep it up by *linings* of the same material as the hotbed, added to the sides of it. The sashes of hotbeds must be partially removed during the day, to permit ventilation and the escape of vapor.

HOTCHKISS, *hŏch'kĭs*, BENJAMIN BERKELY: 1830-1885, Feb. 14; b. Conn.: inventor. He learned the machinist's trade, invented his first rifle field-gun 1856, designed an improved system of rifling-belt and percussion fuse for projectiles, and manufactured them and the shell bearing his name for the U. S. govt. through the civil war; invented and sold to the French govt. an improved metallic cartridge case 1867, designed the revolving cannon, the magazine-rifle 1875, and the quick-firing gun since adopted by France, England, and the United States 1882, and in the latter year organized a company for manufacturing his guns in the countries using them. See MACHINE GUN.

HOTCH'POT: term in English law to denote that where one child has already received an advancement out of the father's personal estate, that child must bring such sum into hotchpot before he will be allowed to share with the other children, under the statute of distributions, after the father's death. See COLLATION.

HOTCH-POTCH, or -POT, n. *hŏch'pŏch* or *-pŏt* [F. *hoche-pot*—from *hocher*, to shake, to wag: see HODGE-PODGE, but HOTCH-POT is the older spelling]: a mingled mass; a mixture of ingredients; a farrago; hodge-podge. The Scottish dish Hotch-potch is a kind of mutton-broth in which green peas take the place of barley or rice. Hotch-potch is considered the *chef d'œuvre* of Scottish cookery.

HOT-COCKLES, n. *hŏt-kŏk'lz* [F. *hautes coquilles*]: child's game in which one covers his eyes and guesses who strikes him.

HOTEL, n. *hō-tĕl'* [OF. *hostel;* F. *hôtel*, a mansion (see HOST 1 and HOSTLER): a corruption of *hospital*]: a superior house for entertaining strangers or travellers;

an inn; in *France*, a palace; a town mansion—in like manner Inn was anciently used in England to denote the town mansion of a great man. HÔTEL DE VILLE, *ō-těl′ dĕ vēl′* [F. hotel of the town]: in *France* and *Belgium*, the city-hall or town-house. HÔTEL DIEU, n. *-ō-těl′ dŭ* [F. *hôtel*, and *Dieu*, God]: in *France*, a hospital.

HOTEL′: large or superior inn, or house for temporary accommodation of travellers or of transient sojourners. The name hostelrie was applied by Chaucer to a public inn, and till a more recent period it was used similarly in Scotland. From its general use comes the designation hostler, which originally signified the keeper of the inn or hostel. Only in recent times has the significant old English word inn been eclipsed by the reintroduction of hostel, under the softened form of hotel.

An account of inns ancient and modern, under whatever designation, would form an interesting chapter in social history. The caravansarai (q.v.) of the east is the most ancient species of inn of which there is any notice. The Greeks and Romans did not improve on the quality of these oriental establishments. Their inns, if worthy of the name, were little better than receptacles for humble classes of wayfarers, or places where cooked food and wine were dispensed to the hungry and thirsty stranger. Along their highways, the Romans gave encouragement to these primitive inns; the best of such establishments being called *caupona*, or *taberna diversoria*, while those of an inferior kind were known as *popinæ*, of which some specimens have been disclosed at Pompeii.

The duties of hospitality and the obligations of religion long postponed the introduction of regular inns. In mediæval times, the castles of the barons offered shelter with straw, and sometimes food, to the wayfarer of high and low degree, and there are traditions to the effect that to pass some of these strongholds without calling to render obeisance, and receive the hospitality of the owner, was deemed an insult. But the monastic establishments, great and small, scattered over every part of Christendom, formed the chief *hospitia* (see HOSPICE). With the general improvement of society and the increasing concourse of travellers came the modern inn, or professional hospitium, at which entertainment for man and horse was afforded as a matter of business. Nowhere in Europe did this class of establishments so soon attain to a determinate and respectable character as in England. Growing into importance first in London, York, Oxford, Bristol, and some other cities, the substantial and well-managed English inn was imitated on a smaller scale in the different provincial towns, and gained a good standing in national usage before it spread to Scotland; the inns of which, even till the middle of the 18th c., were on a meagre scale of accommodation. All of these have either disappeared, or

have been changed in character. For the most part, the old inns of London, Westminster, and Southwark consisted of a building round a court-yard, entered from the street by a wide covered passage. The ground-floor was disposed as stables, kitchens, and other offices, with a large reception room; above, were the lesser apartments and bedrooms, these last all opening on hanging wooden galleries, whence the inmates could look down on the busy scene of arrivals and departures in the court-yard beneath. Some specimens of these old inns with open galleries remain. Of the character and management of the inns of England, we are favored with innumerable glimpses of the fiction of Fielding, Smollett, Goldsmith, and others.

In England, the hotel system of living is simply that of paying for what is called for, with the addition of a certain charge per diem for the rooms occupied; in France and other continental countries, this plan is modified by the plan of dining at a table d'hôte, which lessens the general expenses. Both in English, and continental hotels, the charge for attendance is now made explicitly in the bill, a very grateful improvement. The ordinary hotels in all parts of the United Kingdom are licensed by magistrates to sell wines, spirits, and other excisable liquors.

The first hotels in the United States were conducted on the so-called American plan, which provided a fixed price for a day and for each fraction of a day. In those times $1 a day was considered a 'good round price,' and taverns were ordinarily so small that one which was provided with 20 rooms was regarded as a most commodious house.

In 1829, the Tremont House was opened in Boston, and for years it was noted as being the grandest hotel in the land, if not the most elegant public house in the world. A few years later hotels of similar size and importance were opened in other cities.

The last two decades of the 19th century were conspicuous, not only for the sudden increase of new and more splendid hotels, but also for the enlargement and improvement of those already built, in every part of the country, while, in such a brief review of the hotel business, it is impossible to name all the hotels worthy of mention that have been built during the past 25 or 30 years, it may justly be said that the revival of interest in the making of new and better houses extended from the Atlantic to the Pacific, and from our northernmost boundary to the Gulf. The impetus to the hotel business, which began some 30 years ago, has continued up to the present time, for the last few years have witnessed the construction of many new and finer hotels than any that had hitherto been built, among them being the Imperial, the Savoy, the Holland, the Waldorf, the New Astor, and the St. Regis, while one of the most unique experiments

in the hotel line was the establishment of the Martha Washington, a hotel exclusively for women, which is now being successfully operated, also in New York. The watering-place and summer-resort hotels also represent an important and rapidly increasing branch of the business. At such hotels the American plan usually prevails, as it does to a considerable extent throughout the smaller cities and towns. In the large cities, however, the European plan, which fixes a price for the room, and which charges for extra service and for each item on the bill of fare, has become more popular, for while, in some instances, the two plans are combined, it is the European plan that is generally followed by the large hotels. Moreover the charges at the best hotels are about twice as great as they were in 1850.

When compared with the palatial hotels of to-day even the fine houses like the Tremont and the Astor House were primitive in their construction and management. The modern hotel is equipped with running water and set basins in every room; many rooms also have water-closets and baths with exposed plumbing; everywhere there are open grates and steam heat, improved ventilation, elevators for both passengers and baggage, electric bells, telephones, and every possible device to prevent fire, or to assure the safe escape of guests in case of a conflagration. Utensils and machinery have also multiplied greatly during the past few years, for the best hotels now run a thoroughly up-to-date laundry, an electric lighting plant, apparatus for the distilling of water, and the most elaborate cold-storage conveniences, often including an individual ice-making plant, while, among the other necessary conveniences of every well-equipped hotel, one may mention the reading, writing, and music rooms; the coat, package, and baggage rooms; the barber shop, with its manicuring, boot-blacking, and other accessories; the billiard-room; telephone, telegraph, and ticket offices; the book and news-stand; the stenographers and typewriters, and the carriage and messenger services, not to mention a score of other details that are just as imperative a necessity. It is no uncommon thing to-day to find single hotel structures valued at $3,000,000 or $4,000,000, equipped with furnishings costing many hundred thousand dollars.

A conservative estimate of the number of hotels in the United States places the number at 44,250. Of these about 3,750 are summer or winter resort hotels, 3,000 are family, or private hotels, while the balance are commercial houses. These hotels now give employment to no less than 3,250,000 persons, and the amount of capital invested in the business is undoubtedly in excess of $6,000,000,000. For laws respecting hotels, see INN—INNKEEPER.

HOTHOUSE: a structure in which exotic plants are grown by the aid of artificial heat. In a loose way, the term is applied to the various buildings in which a high

temperature is maintained during the cold season, as the greenhouse (q.v.), conservatory, and stove, but is more properly restricted to those in which heat is supplied during the year. The hothouse is more frequently provided as a luxury, while the greenhouse is often made a source of profit by supplying the means for forcing vegetables for the early market. The sides, as well as the roof, of the hothouse are largely composed of glass. Heat is furnished by flues or by means of steam, or hot water, conducted by pipes throughout the building. Either of the latter methods, though more expensive, usually gives better satisfaction than flues. The proper management of the hothouse requires constant care and a high degree of skill. Not only must the temperature be regulated day and night, but the right degree of moisture of soil and air must be secured, the light must be modified to suit the wants of the plants, and ventilation must be given with the greatest care. Unceasing watchfulness will also be needed to prevent injury by insects, and to guard against the fungoid diseases to which plants grown in an artificially hot and moist climate are peculiarly susceptible.

HOT SPRINGS: city, cap. Garland co., Ark., 55 m. w. by s. of Little Rock; celebrated as a resort for invalids to the hot springs which give the name to the village and the county. Fifty-seven springs, temperature 93° to 150° F., break out from the w. side of a mountain, and flow into a creek, which empties into the Wachita river, six m. distant. There are also cold chalybeate springs, much frequented, and sulphur springs, in the same county. With one exception, the springs are all enclosed in solid masonry, and the water is conducted by protected pipes into reservoirs near the base of Hot Springs Mountain or to the 23 bath-houses on and off this reservation. The exception is left open and accessible to the public. The government maintains a free bathing establishment for the indigent at which over 10,000 bathe annually, over 90 per cent. being benefited. The prices of baths and fees of attendants are fixed by the Department of the Interior, with severe penalties for deviation. A rental of $30 per annum is collected for each tub. A handsome city has grown up to house the guests and permanent residents. Along the front of the reservation bath-houses and on the slope of Hot Springs Mountain is a fine park of 100 acres, with the most elegant buildings facing it. The creek is covered in, and sidewalks and roadways built over it. Several of the hotels, as the Arlington, Eastman, Park and Majestic, are among the largest and best appointed in the country.

Hot Springs received its city charter in 1876. It has a biennial mayor and a council. Being a pleasure resort, as well as a health resort, it has a large itinerant population. Large quantities of novaculite rock, 'Arkansas' and 'Ouachita,' are quarried in the surrounding mountains, and 5,000 bales of cotton are marketed annually. The

country abounds in cold springs, some of which have remarkable curative properties, notably Mountain Valley and Potash-Sulphur 10 and 7 miles distant from Hot Springs; these are efficacious in conditions affecting the kidneys and intestinal tract. As many as 90,000 persons have visited the baths in one season. Pop.(1910) 14,343.

HOTTENTOT, n. *hŏt'ĕn-tŏt'* [probably from the click of the language of the s. African tribes—*hot-en-tot*]: a native of s. Africa; a bushman or Bosjesman; thence, *fig.* a savage or brutal man. It is the name given by Europeans to a singular race of people, supposed to be descended from the aborigines of s. Africa, and now dwelling for the most part in and about the English settlement of the Cape of Good Hope. The origin of the name Hottentot is uncertain. Some think it is a word coined by the early Dutch settlers to convey some idea of the peculiar clicking noise made by the people when speaking. Dampier, however, wrote the name *Hodmadod,* instead of Hottentot; and Prichard says that it is probably a corruption of *Houteniqua,* the name of a particular tribe now extinct, or at least unknown. They now call themselves by various names, supposed to be those of tribes, as Attaquas, Hessaquas, Dammaras, Saabs or Saaps, Namaquas, and Koranas; and by the collective name of Gkhuigkhui or Khoikhoin ('men,' to distinguish themselves from Bushmen).

Ethnologically, the Hottentots form a distant group of races, unconnected with the Bantu tribes (Kaffirs, etc.), who are their neighbors, and probably not allied with the Bushmen. Latham put them in his second great division of the human family—Atlantidæ. By Blumenbach, they were ranged under his third division race—the *Ethiopians.* But the Hottentots are not like the negroes, and are more akin to the Mongolians; having broad foreheads, high cheek-bones, oblique eyes, and a dirty, olive-colored complexion. The width of the orbits, their distance from each other, the large size of the occipital foramen, are points in which the Hottentots resemble the n. Asiatics, and even the Esquimaux. The person of the Hottentot, when young, is remarkable for symmetry. The joints and extremities are small, and the males look almost as effeminate as the women. The face, however, is in general extremely ugly, and with age this ugliness increases. Sir John Barrow, in describing Hottentot women, observes of them that before child-bearing they are models of proportion, every joint and limb rounded and well turned, their hands and feet small and delicate, and their gait not deficient in grace. 'Their charms, however, are very fleeting. At an early period of life, and immediately after the first child, their breasts begin to grow loose and flaccid, and as old age approaches, become distended to an enormous size; the belly protrudes; and the hinder parts swelling out to incredible dimensions, give to the spine a degree of curvature inwards that makes it appear as if the *os coccygis,* or bone at the lower extrem-

ity of the spine, was elongated and bent outwards, which is not the case.' The appearance of the Bosjesmen or Bushmen (q.v.), who may be a degraded branch of the Hottentots, is still more unattractive.

The language of the Hottentots is quite as singular as their personal appearance. It has been called 'the click language,' and has also been compared to the clucking of a hen when she has laid an egg. The dress of the H. in his native state is exceedingly simple, being merely a strip of the skin of some animal tied round the waist, from which there depends a sort of apron both before and behind. This is nearly the same for both sexes, so that in the summer both go almost naked, protecting their persons from the sun by a covering of grease; but in the winter they have a sort of cloak made with skins, that covers nearly the whole body. The Hottentots live in kraals or villages, consisting of a number of circular huts like bee-hives. They have oxen and sheep, in the management of which they show great skill. They are addicted to the chase, in which they use poisoned arrows, javelins, and spears. Their only manufacture is a rude kind of earthenware; except, of course, that they make their own sheep-skin clothes, such as they are; also their bows and arrows, and other weapons. Like most savages, they have some taste for music, which they practice upon a rude sort of guitar with three strings, and a flute made of the bark of trees. Of religion, there appears very little notion among the H., and they have no particular observances at either births, marriages, or funerals. Dr. Prichard, however, observes of them: 'Although the wild tribes of the H. race display ferocity and all the other vices of savage life, yet we have abundant proof that these people are not insusceptible of the blessings of civilization and Christianity. No uncultivated people appear to have received the instruction of the Moravian missionaries more readily than the Hottentots, or to have been more fully reclaimed and Christianized.'

The Hottentots, as a distinct race, became known to Europeans first about 1509, when Francisco d'Almeyda, Viceroy of India, landing at Table Bay, was killed with about 70 of his followers, in a scuffle with the natives. They were afterward frequently visited by navigators from different countries; but no authentic account reached Europe respecting them until the Dutch settled in the Cape of Good Hope in the middle of the 17th c. They were then much more numerous than at present, but becoming addicted to rum and brandy, their numbers diminished gradually. Many of the tribes parted with their flocks and herds to procure the fire-water, and eventually they became the absolute slaves of the Dutch settlers or Boers. From this condition they have been delivered by the enlightened and humane policy of the British government; and as free laborers they make excellent herdsmen and drovers. Their number at present is thought to amount to 15,000 to 20,000, not including those who probably dwell more in the interior. Of the Bushmen, no

numerical estimate has been formed. They are widely scattered throughout the English settlements but their numbers must be very small, while their wretched and degraded habits are such that it is thought they will soon become utterly extinct.

HOT'TENTOT COUN'TRY: region of s. Africa, stretching indefinitely to the n. from the Cape Colony, having the Atlantic on the w., and the Bechuanas and Kafirs on the e. In e. long. it extends between 15° and 27°; and in s. lat. between 31 and some line n. of the tropic of Capricorn. This territory is of little value. Its principal river, the Orange, is almost useless for navigation; and though the surface here and there is well wooded, yet it is chiefly an arid desert. The only examples of civilization are to be found in several missionary establishments.

HOT'TENTOTS' BREAD: yam plant of the species *Testudinaria elephantipes*, order *Dioscoreaceæ*, indigenous to the Cape of Good Hope region of s. Africa. It was formerly supposed that its tubers or rootstock formed part of the Hottentots' daily food, but it is now believed that animals only eat them. These roots grow half in and half above the ground, and send out pretty branches bearing green heart-shaped leaves, which render the plant popular as a climber under cultivation. The rootstock is frequently 3 ft. in diameter, and its surface somewhat resembles the shell of a large tortoise. From this earth-brown and apparently dead stock stems have been known to climb to a height of 20–40 ft. in a few weeks. It differs in habit materially from the yam, but is very similar to it in flower and fruit,

Water Violet (*Hottonia Palustris*):
a, corolla; *b*, calyx; *c*, pistil; *d*, stamen.

HOTTONIA, *hŏt-to'ni-a*: genus of plants of nat. ord.

Primulaceæ, of which one species, *H. palustris*, Water Violet or Featherfoil, is a beautiful aquatic plant. Its leaves all are submerged, crowded, and much divided; the large, beautiful, pale purple, whorled flowers alone rise above water on a long cylindrical stalk. Other species of H. are found in the East.

HOT WALLS, or FLUED WALLS, in Gardening: walls furnished with furnaces and flues, in order to the production of finer kinds of fruit than could otherwise be expected in the climate. The flues are led as obliquely, and make as many turns from right to left as are consistent with their drawing well, so that as little heat as possible may escape by the chimney, and as much as possible may be expended on the wall. The heat is applied chiefly during spring. At that season, also, movable glazed frames, or sometimes mere screens, are placed in front of the walls.

HOUA'RIOS: small coasting vessels and pleasure-boats used in parts of the Mediterranean. They bear lateen sails, and have each two masts and a bowsprit.

HOUDAH: see HOWDAH.

HOUDIE: see HOWDY.

HOUDIN, *ō-dăng'*, ROBERT: 1805, Dec. 6—1871, June; b. Blois, France: conjuror. He received a collegiate education, learned the watch-making trade; and for several years was engaged in Paris making mechanical toys and automata, for which he obtained a medal at the Paris exhibition 1844. In the following year he began his career as a conjuror, performing many wonderful feats by means of mechanical aids of his own invention. He made a practical application of electricity to clocks, for which he received the gold medal of the exhibition 1855; and having sold his *soirées fantastiques* to his brother-in-law, he retired from public life. But 1856 he was sent to Algeria by the French govt., and succeeded in measureably breaking the influence of the marabouts over the Arabs by outdoing the pretended miracles of those priests. He published *Robert Houdin, sa vie, ses œuvres, son théatre* (1857), *Confidences* (1859), and *Les tricheries des Grecs dévoilés* (1861).

HOUDON, *ō-dōng'*, JEAN ANTOINE: 1741, Mar. 20—1828, July 15; b. Versailles, France: sculptor. He studied art with Slodtz, Pigale, and in the school of fine arts, where he took the first prize for sculpture 1760, which gave him 10 years' residence and study in Rome. While in Rome he executed a colossal St. Bruno, and on his return to Paris statues of Voltaire, Cicero, and Tourville, and busts of Napoleon, Josephine, Ney, Rousseau, Barthelémy, Mirabeau Franklin, and other eminent people of the day. He was elected a member of the French Acad., came to the United States with Franklin 1785, and after being a guest of Washington at Mt. Vernon executed the statue of him for the state of Va. now in the capitol at Richmond.

HOUFF, n. *howf* [AS. *hōf*, a house: Icel. *hof*, the forecourt or hall: Ger. *hof*, a yard or court]: in *Scot.*, a hall; a place of resort; a haunt; a place of concealment.

HOUGH, n. *hŏk* [Ger. hacke, the heel; *hackèn*, to dig: Icel. *há*, as in *hásinn*, a hock-sinew: Dut. *hak*, the heel (see HOCK)]: the lower part of the thigh; the ham; the joint of the hind-leg of a beast: V. to disable by cutting the sinews of the ham. HOUGH'ING, imp. HOUGHED, pp. *hŏkt*.

HOUGHTON, *hō'ton:* vill. cap. of H. co., Mich.: on Lake Portage, 10 m. from Lake Superior, 28 m. n. of L'Anse, 70 m. n.w. of Marquette. It is the centre of the vast Lake Superior copper mining region, the H. co. mines now producing 95 per cent. of all the copper mined in the region; is connected with Lake Superior via Lake Portage by a ship canal and with the former lake ports by large steamboats; has churches, banks, Michigan College of Mines, court-house, schools, etc., and contains rich copper mines, copper rolling mill, smelting furnaces, manufactories of copper and iron, and 2 steam saw mills. The co. and cap. were named after Dr. Douglass H., who discovered pure copper in the present Ontonagon co. 1830; gold in Baraga co. 1845. Pop. (1910) 5,113.

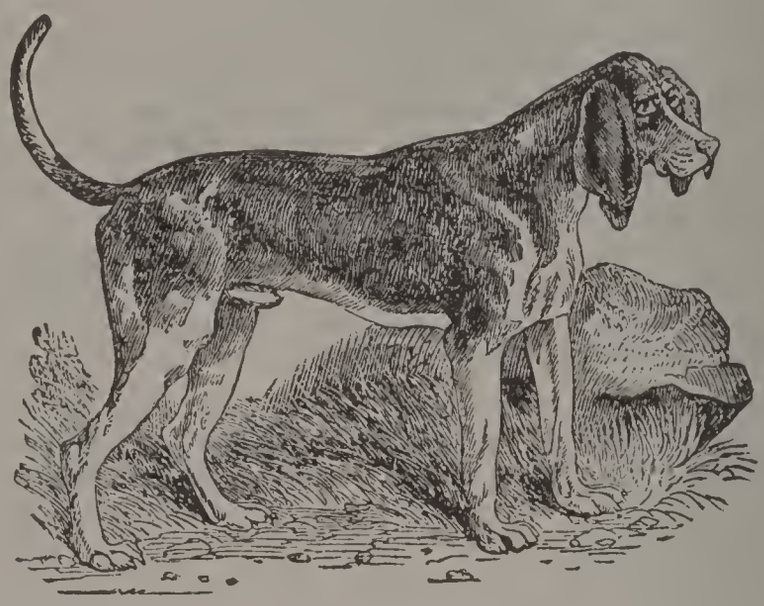
HOUGHTON (RICHARD MONCKTON MILNES), Lord: 1809, June 19—1885, Aug. 11; b. Yorkshire, England: author and statesman. He graduated at Trinity College, Cambridge, 1831, was member of parliament for Pontefract as conservative and liberal 1837–63, and was raised to the peerage 1863, Aug. 20. He travelled extensively in early life, promoted popular education, religious equality, and criminal reformation while in parliament, and entertained the most cultured people of Europe and America at his grand estate, Fryston Hall. Beside many political pamphlets and speeches he published *Memorials of a Tour in Greece* (1833); *Memorials of a Residence on the Continent, and Historical Poems, and Poetical Works* (1838); *Poetry for the People, and Other Poems* (1840); *Palm Leaves, Eastern Poems, Poems Legendary and Historical, and Poems of Many Years* (1844); *Good Night and Good Morning* (1859); *Monographs, Personal and Social* (1873) and *Poetical Works* (1874).

HOUGHTON-LE-SPRING, *hō'ton lĕ sprĭng:* town of the county of Durham, England, nearly 7 m. n.e. from Durham, on the Great Northern Railway. The town has recently much increased, and owes its prosperity mainly to the numerous coal-mines of the neighborhood, the coal produced by which is excellent. The surrounding district is very populous and contains numerous villages. Pop. of H. (1901) about 7,000.

HOULTON, *hōl'ton:* town, cap. of Aroostook co., Me.; on the Canadian Pacific and Bangor and Aroostook railroads, 14 m. w. of Woodstock, N. B., 100 m. n.n.e. of Bangor. It is an important point in the lumber region; contains churches, banks, the Ricker Classical Institute, grist-mills, carding-mills, saw-mills, iron-foundry, machine-shop, woolen-mill; and does considerable business in potatoes, hay, starch, hemlock bark, and cedar-shingles. Pop. (1910) 5,845.

HOU'NAN: see HU-NAN.

HOUND, n. *hownd* [Ger. *hund;* Icel. *hundr;* Goth. *hunds;* Gr. *kuon*, a dog: O.H.G *hunon*, to growl as a fox: Esthon. *hundi*, a wolf]: one of a particular breed of dogs used in hunting, as a stag-hound, fox-hound, etc. By systematic writers on dogs, the name is given to those which hunt by scent rather than by sight. When this definition is adopted, greyhounds are not regarded as true hounds. Examples of true hounds are the bloodhound,



Old English Hound (*Canis sagax*).

old English southern hound, the staghound, the fox-hound, the harrier, and the beagle; closely allied to which are the pointer, setter, spaniel, etc. (See these titles.) The hounds are by some naturalists regarded as a distinct species of dog (*Canis sagax*): see DOG. They are characterized not only by fineness of scent, but by great docility and sagacity. The muzzle is not so sharp as in greyhounds, nor is the form so slender. The ears are large and pendulous. Some varieties have rough, and some have smooth hair. The rough-haired varieties are generally those which show the most perfect domestication, and in which the attachment to man is closest. True hounds are figured in ancient Egyptian paintings and sculptures. It is believed that all the best varieties were introduced into Europe in comparatively recent times from the East. HOUND, v. to set on; to chase. HOUND'ING, imp. HOUND'ED, pp. HOUNDFISH, a kind of shark (q. v.). HOUNDS, n. plu. *howndz*, particular projecting parts of a mast-head. TO FOLLOW THE HOUNDS, to be in the habit of hunting. TO HOUND A PERSON, to harass, to annoy a person with the aid of others, as hounds let slip at game in hunting; to persecute unceasingly.

HOUNDS, in English Law: recognized as of use in fox-hunting, as in a sort of privileged pursuit; so that one following the hounds on a stranger's lands, is not liable to an action of law for the trespass. But no more damage is to be done than is absolutely necessary.

HOUND'S-TONGUE (*Cynoglossum*): genus of plants of nat. ord. *Boragineæ*, of which there are many species, all of coarse appearance, with small flowers. The COMMON HOUND'S-TONGUE (*C. officinale*) is a native of Europe, Asia, Africa, and America. It has soft downy leaves, of dull-green color, purplish-red flowers, and a stem about two ft. high. Its odor is very disagreeable. The root was formerly administered in scrofula, dysentery, etc., and is said to be anodyne. It is also one of the pretended specifics for serpent-bites and hydrophobia.

HOUNSLOW, *hownz'lō:* small town of England, county of Middlesex, consisting of a single street, stretching along the Great Western road from London, from which it is ten m. west. Its church, a modern building in the Italian style, is surmounted by 12 small spires and a belfry. The numerous inns and posting-houses of Hounslow were busy and prosperous till the opening of the railways to Southampton and Bath. Previous to that event, its posting business was as extensive as that of almost any town in England. About 800 horses were then maintained here, and about 183 coaches, while 500 coaches passed through the village daily. The Heath, formerly notorious as the scene of highway robberies, is now in great part inclosed. Numerous villas have risen around the town. On the Heath are extensive gunpowder mills, cavalry barracks, and an arsenal. Pop. 10,459.

HOUR, n. *ŏwr* [L. and Gr. *hora,* an hour: F. *heure;* OF. *hore;* Gael. *uair,* time, season: W. *awr,* an hour]: a period of time marked by a clock or watch; 60 minutes; 24th part of a day; a particular time as marked by a watch or clock. The division of the day into hours appears to have been known to the Babylonians and Egyptians, from whom, first the Greeks, and then the Romans derived it. But their scheme of division extended only to the natural day (while the sun was above the horizon), which they divided into 12 parts. The consequence was that the hour varied in length. This system was introduced into Rome by L. Papirius Cursor about B.C. 293, and during the Punic Wars, the Romans adopted the division of the night also into 12 parts. This system continued till about the end of the 4th c., when the present system was adopted. In the British Empire, and most European countries, as in the United States, the day is reckoned from midnight to midday 12 hours, and midday to midnight 12 hours. (See HOROLOGY.) In Italy, the day is reckoned from sunset to sunset, and the hours are counted from 1 to 24. The Chinese reckon from an hour (in our time) before midnight till the corresponding time next night, 12 hours, each hour being equal to two of ours. The Japanese still follow the old custom of reckoning from sunrise to sunset. Astronomers reckon from midday (on the previous day) to midday, counting from 1 to 24. HOUR'LY, a. *-lĭ,* done every hour; frequent; continual: AD. every hour. HOUR-HAND, one of the hands of

a clock pointing to the hours. To KEEP GOOD HOURS, to be at home in good season; to attend closely to one's religious duties. HOURS, certain prayers in Rom. Cath. Church. CANONICAL HOURS, the particular times of certain days appointed by ecclesiastical authority for public worship; also applied to stated times appointed for certain private devotions—see under CANON. HOUR-CIRCLES, the 24 circles drawn from n. to s. on the terrestrial globe, passing through the poles.

HOUR'-GLASS: instrument for measuring intervals of time. It is of glass, and consists of two bulbs united by a narrow neck; one of the bulbs is nearly filled with dry sand, fine enough to run freely through the orifice in the neck, and the quantity of sand is just as much as can run through the orifice in an hour, if the instrument is to be an hour-glass; in a minute, if a minute-glass, etc. The obvious defects of this instrument are the expansion or contraction of the orifice produced by heat or cold, and the variations in the dryness of the sand, all of which produce deviations from the true measurement of the time. Sometimes water has been used instead of sand. The hour-glass was almost universally employed in churches during the 16th and the 17th c. In several churches in England, hour-glass stands of elegant workmanship are still seen.

HOURI, n. *how'rĭ* [Ar. *huri*, a virgin of Paradise—from *hur al oyun*, black-eyed]: among *Mohammedans*, a nymph of Paradise. HOURIS, n. plu. *how'rĭz*. These beautiful beings are represented in the Koran as formed of musk, dwelling in pavilions of pearl. To each faithful Mohammedan, 72 of them are assigned, beside the wives who belonged to him on earth.

HOUSATONIC, *hô-sa-tŏn'ĭk*, RIVER: rising in Mass., flowing southwardly through Connecticut into Long Island Sound. Its length is about 150 m., through a picturesque country, and its numerous falls afford water-power to many manufacturing villages. For 40 m. its course is followed by the Housatonic railroad.

HOUSE, n. *hows*, HOUSES, n. plu. *howz'ĕz* [Goth. *hus*; Dut. *huis*; Icel. *hús*; Ger. *haus*; Hung. *haz*, a house]: any building for habitation or shelter; domestic concerns; manner of living; a family of ancestors or kindred; a trading firm; estates of a kingdom assembled in parliament, as House of Lords, House of Commons; the body, as, 'house of this tabernacle;' the grave, as 'house appointed for all living;' an astrological division of the heavens: V. *howz*, to shelter; to take shelter; to put under cover. HOUS'ING, imp.: N. the number of habitable buildings: see HOUSING. HOUSED, pp. *howzd*. HOUSELESS, a. *hows'lĕs*, destitute of a home. HOUSEBOTE, in *English law*, right of a tenant to cut wood on the land to repair the house (see ESTOVER). HOUSEBREAKER, n. one who enters a house by force to rob it (see HOUSE, in Law).

HOUSEBURNING, name in *Scotch law* for ARSON. HOUSE-DOG, a watch-dog. HOUSE-DOVES, doves kept in dove-cotes near a house; in the *law of England,* they are protected like domestic animals. HOUSE-FACTOR, in *Scot.,* an agent for the sale or letting of houses. HOUSE OF GOD, a temple or church. HOUSEHOLD, n. a family living together: ADJ. of the house or family; domestic. THE HOUSEHOLD, OR ROYAL HOUSEHOLD, in *Great Britain,* domestic establishment of the sovereign. HOUSEHOLDS, n. plu. *-hōldz,* among *millers,* a certain quality of wheaten flour. HOUSE'-HOLDER, n. one who occupies or owns a house. HOUSE-HOLD GODS, all those minor articles and domestic pets that so much endear to us our homes; for household gods among the anc. Romans, see LARES, MANES, AND PENATES. HOUSEHOLD SUFFRAGE, in *English law,* the right to vote, as restricted to householders. Male citizens of proper age, having occupied a distinct dwelling or part of a dwelling 12 months, and having paid their assessed rates, are entitled to vote: also lodgers, occupying continuously for 12 months and paying a rental above a certain amount. HOUSE'KEEPER, n. one who has the chief care of a house or family. HOUSE'KEEPING, n. domestic concerns and management. HOUSELINE, n., or HOUS'ING, n. among *seamen,* a small line of three strands. HOUSEMAID, n. a female servant who attends table, and has the care of the rooms, furniture, etc. HOUSE OF CALL, among *tradesmen,* a house where journeymen of a particular trade assemble when out of work, and where they can be hired by masters. HOUSE-RENTS: see LANDLORD AND TENANT. HOUSE-ROOM, lodging in a house; free space. HOUSE-STEWARD, a superior domestic who manages a large household. HOUSE-WARMING, n. *-wawrm-ĭng,* a familiar name for an entertainment on the occasion of taking possession of a new house or new premises, generally for business purposes. HOUSEWIFE, n. *hows'wīf,* the mistress of a house who is a good manager. HOUSEWIFE, n. *hŭz'ĭf,* a little case for needles, etc. OPEN HOUSE, hospitality to all comers. RELIGIOUS HOUSE, a monastery or convent. TO BRING DOWN THE HOUSE, to draw an outburst of applause from the entire audience, as in a theatre. HOUSE OF COMMONS, lower branch of the British legislature. HOUSE OF LORDS, upper branch of the British legislature. —SYN. of 'house': tenement; dwelling; family; household; lineage; race; ancestors; descendants; kindred; tribe; a firm; a company; residence; building; edifice; mansion; abode; an inn; hotel; monastery; college; theatre.

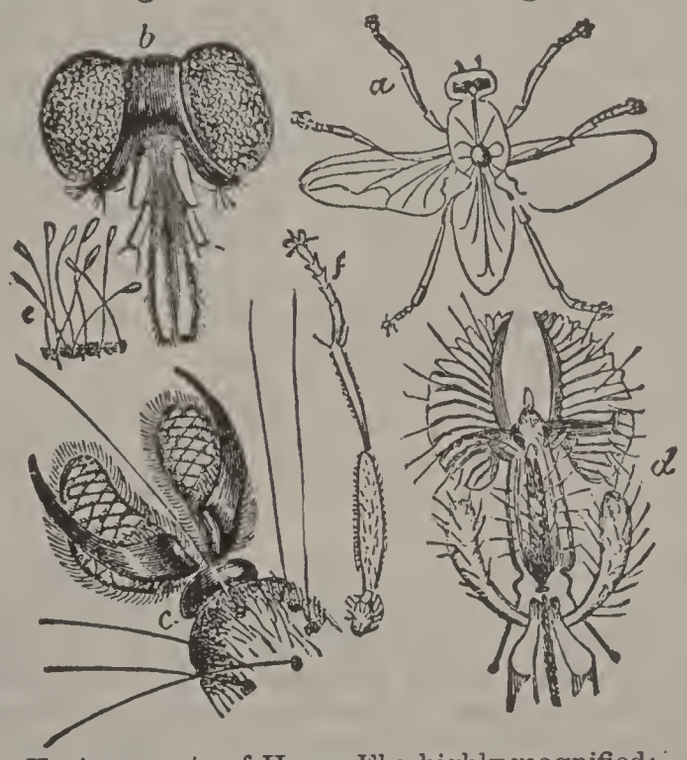
HOUSE: a place of abode of a family or individual. The expression, 'a man's house is his castle,' is in most instances true. Except in criminal cases a man can hold his house against all comers. No sheriff can break open his door to arrest him, or seize his goods for debt, except by a writ, affidavit, or search-warrant. But the house is no protection where there has been a criminal offence.

Where the party is charged with a criminal offense, a constable armed with a warrant, or in some cases without, is entitled to break into the house and arrest him. A man is entitled also to defend his house against trespasses and thieves, using no greater force than is necessary; and if necessary in that sense, he may even kill the intruder, though very strong circumstances are required to justify this. All offenses committed in a house are generally punished more severely. (See HAIMSUCKEN, in Scotch law). *Housebreaking* is a technical name in Scotland, but in England is a popular phrase, the legal terms being larceny or robbery in a dwelling-house, or burglary, according to the circumstances.—The law in the United States is the same as in England, with one or two variations in a few states. In a criminal case, an officer with a warrant can make forcible entry.

HOUSE, APART'MENT; or FLAT: domicile so constructed that each floor provides accommodations for a single family. The evolution of this kind of habitation in large American cities, particularly in New York, exhibits curious features of social life. The idea originally contemplated a convenience to people of moderate means, those who could afford to pay a little more than common tenement house rent, but not sufficient for half-houses or whole ones in better neighborhoods. The necessity for improved dwellings for what is called the working-class was demonstrated by the Metropolitan Board of Health, and stimulated by the efforts of George Peabody, the Baroness Burdett-Coutts, and Lord-Mayor Waterlow in London; Sir Titus Salt in Yorkshire, England; the Krupp brothers in Essen, Prussia; Schneider in Creuzot, France; and by the municipalities of Edinburgh and Glasgow. The first provision of the house-on-one-floor plan in New York was the French flat, which for several years failed of appreciation. In 1879 interest in the reform was renewed by favorable legislative action, the sympathy of prominent and wealthy citizens expressed in a notable mass-meeting Feb. 28, the agitation by building loan-associations, and the successful experiments of the Rev. John Cotton Smith, D.D., of the Church of the Ascension (Prot. Episc.). In the following year a member of 'model tenements' were built and speedily occupied. Capitalists then began venturing the erection of other and larger ones, over the construction of which both the board of health and the building dept. exercised a vigilance authorized by the legislature and the municipal ordinances. Thus thousands of stifled, over-crowded, filth-recking, and disease-breeding tenements gave way to buildings in larger accord with sanitary science. These structures were still called 'tenements,' and were erected for working-people of small incomes. Their success led shrewd architects and capitalists to believe that buildings constructed on the same general principles but with larger accommodations and more provision for the comforts and elegancies of domestic life would become equally popular with those who could afford to pay a somewhat higher rent. Hence they began

elaborating, putting in marble mantels, stationary ranges and tubs, elevators, ash shoots, plate-glass windows and sliding doors, beautiful frescoes, flooring of artistic tiles, and officious janitors. The result was that the one-floor apartment, planned for people in very moderate circumstances, soon developed into brown-stone, brick, granite, marble, and iron, 6, 8, and 10 story 'flats,' with single floors commanding a higher rental then entire 4 and 5 story buildings in good uptown neighborhoods. Wealth and fashion have conformed to the new idea, and the beautiful streets and avenues in the best parts of the city and around Central Park abound with enormous piles of masonry, bearing aristocratic names, costing $250,000 and upward each, possessing every convenience of luxurious domestic life, and renting from $40 to $500 per month per floor according to height from the ground. Some of the grandest and most expensive of these buildings have not yet reached financial success.

HOUSE'-FLY (*Musca domestica*): insect of the vast dipterous family *Muscides*, remarkable for its extensive distribution in the old and in the new world. The maggots live in moist dung, in heaps of rotting vegetables, etc. The insect, annoying as it often is, is exceedingly useful by reason of the great amount of scavenger-work which it



Various parts of House-Fly, highly magnified:
Copied from Samuelson's *Earthworm and Common House-Fly.*

a, section of fly, showing nervous system; *b*, head of house-fly, showing the compound eyes, and, beneath, the proboscis; *c*, last joint of tarsus, or foot of fly, with hooks and pads; *d*, proboscis of house-fly; *e*, portion of fringe of the pad, to show the supposed suckers; *f*, leg of fly.

performs in and around human habitations. When house-flies become annoying, various expedients are resorted to for killing them, as trapping in glasses partially filled with some sweet viscid fluid, or by pieces of paper covered with

a mixture of sweet and poisonous substances. Sweet substances, however, attract flies into a room, so that the benefit of fly-traps is often doubtful; and care must be taken that the poisons used do not endanger the lives of children and others. Quassia is safe enough in this respect, and very fatal to flies. Wire screens rising and falling, like sash in windows, and hinged as doors, are now extensively used to exclude them from houses.

For the power which many insects possess of walking on perpendicular walls, ceilings, etc., see DIPTERA. Recent observations seem to show that though the membranous disks (*pulvilli*) on the foot of a fly are incapable of being used as suckers, yet the hairs with which they are thickly beset are terminated by minute disks, which probably are so used. At the same time, these minute disks appear to exude a liquid, not viscid, which may serve to make the adhesion more perfect.

The proboscis of the H. is an interesting microscopic object. It is formed chiefly by an extraordinary development of the *tonguelet* or *ligula*, the upper part of the under lip (*labium*), but with this are combined lancets formed of the metamorphosed *maxillæ* (see COLEOPTERA). The lobes of the ligula are much enlarged and fleshy. They are surrounded by rough hairs, to aid in scraping or tearing delicate surfaces. There are many rows of these hairs on each lobe. In using its proboscis to feed on dry substances, as sugar, the fly moistens them with a liquid which may be regarded as saliva, so as to fit them for suctorial action. To aid in this suctorial action, the muscles of the lobes of the ligula are disposed in a spiral form.—The first thorough investigation of the whole economy of the house-fly is in Dr. A. S. Packard's admirable paper in *Proceedings of the Boston Soc. of Nat. Hist.* XVI (1873, 4), 136–150.

HOUSEL, n. *how'zĕl* [AS. *húsel* for *hunsel*, the Eucharist: Goth. *hunsl*, a sacrifice: comp. F. *hostie;* mid. L. *hostiă*, the Host or consecrated wafer]: in *OE.*, the Eucharist or Lord's Supper: V. to give or receive the Eucharist; to administer the Eucharist to one on his deathbed. HOU'SELLING, imp.: Adj. sacramental. HOUSELLED, pp. *how'zĕld.*

HOUSE'-LEEK (*Sempervivum*): genus of plants of nat. ord. *Crassulaceæ*, having a calyx of 6–20 sepals, the petals equal in number to the sepals, and inserted into the base of the calyx: the leaves generally very succulent, and forming close rosettes. The COMMON H., or CYPHEL (*S. tectorum*), called *Fous* or *Foucts* in Scotland, and in some countries *Jupiter's Beard*, grows wild on the rocks of the Alps, but has long been common in almost every part of Europe, planted on walls, roofs of cottages, etc.; and has been introduced into America. It sends up leafy, flowering stems 6–12 inches height, bearing branches of pale-red, star like flowers, equally curious and beautiful. The leaves cut or bruised, and applied to burns, afford immediate relief; as they do also in stings of bees or wasps; and they are a beneficial application to ulcers and inflamed

sores. They were formerly in high esteem as a remedy for fevers and other diseases, and an edict of Charlemagne contributed greatly to the extensive distribution of the plant. The edict is in these words: *Et habeat quisque supra domum suum Jovis barbam* (And let everybody have the Jupiter's beard on his house).—Other species possess similar properties. *S. soboliferum,* with yellowish-green flowers, is frequently planted on walls in Germany. Some of the species, natives of s. Europe, Canary Isles, etc., are shrubby; others are common greenhouse plants.

HOUSE'MAID'S KNEE: term commonly applied to an acute inflammation of the bursa or sac that intervenes between the patella, or knee-pan, and the skin. Housemaids especially are liable to it from their kneeling on hard, damp stones or floors in some household duties. It causes, when inflamed, considerable pain, swelling, and febrile disturbance. In a chronic form there is simply a swelling which gives to the hand the sensation of a bladder filled with fluid; pain and constitutional disturbance are absent. The only disease for which housemaid's knee can be mistaken is acute or chronic inflammation of the synovial membrane lining the cavity of the joint; but in this disease, the patella is thrown forward, and the swelling is at the sides, while in housemaid's knee the swelling is very superficial, and is in front of the patella.—The treatment consists essentially in the means usually employed to combat inflammation; viz., rest, leeches, fomentations, and purgatives; if suppuration takes place, the sac must be freely opened, and the pus evacuated. (See BURSITIS.)

HOUSE OF CORREC'TION: jail, usually not under the ordinary charge of the sheriff, but governed by a keeper; in England it is sometimes called a Bridewell. These houses were originally intended for the detention of vagrants and convicted persons, and compelling these to work; but the distinction between jail and house of correction is abolished in England, and is no longer definite in the United States. In general, they are the same as penitentiaries, for criminals of a grade less than those who are sentenced to state prisons. See PRISONS.

HOUSING, n. *howz'ĭng* [F. *housse;* OF. *houce,* a short mantle worn about the head and shoulders in bad weather, a foot-cloth for a horse, a coverlet for a bed—from mid. L. *hultĭă:* mid. L. *hucĭă,* and *housĭă,* a tunic, a coverlet]: a cover or protection to anything, as to a vessel in harbor. HOUS'INGS, n. plu. the trappings of a horse.

HOUSSA, *how'sâ,* or according to Dr. Barth, HÂUSA: district of Africa, in Sudan, now incorporated in Nigeria, north of the junction of the Berne and Niger rivers. The name, however, is used to designate rather the race inhabiting the district, and the language which there prevails, than to mark any distinct political division. Houssa Proper comprises seven states. The country of the

Houssa is very beautiful, and the inhabitants are noted as able craftsmen and traders.

HOUSSAYE, *ô-sā'*, ARSÈNE: author: b. Bruyères, France, 1815, Mar. 28; son of a wealthy miller. He removed to Paris and published the novels *La Courrone de Bluets* and *La Pécheresse* 1836, was aided in his literary aspirations by Jules Janin and Théophile Gautier, worked sometimes in conjunction with Jules Sandeau, edited *L'Artiste* 1844-49, was director of the Comédie Française 1849-56, became inspector-gen. of the works of art and the museums of Paris 1856, and a proprietor and managing editor of *La Presse* 1861. His writings include poems, novels, comedies, and sketches of art, artists, literature, and society. His *Histoire de la Peinture Flamande et Hollandaise* (1846) received a govt. subvention of $10,000. Among his works are: *Gallerie de Portraits du XIIIe Siècle* (1844, 10th ed. 1874-76); *Philosophes et Comédiennes* (1850); *Les Femmes sous la Régence et sous la Terreur* (1852); *Histoire de l'Art Française* (1860); *Nos Grandes Dames* (1868); *Les Parisiennes* (1869-70); new edition of poems (1877); and *Les Confessions: Souvenirs d'un Demi-Siècle 1830-1880* (1885). He died, 1896.

HOUSTON, *hū'ston:* city, cap. of Harris co., Tex.; on the w. bank of Buffalo bayou; at the head of tide-water navigation on that stream, and the Houston and Texas Central; International and Great Northern; Galveston, Harrisburg and San Antonio; Texas and New Orleans; Galveston, Houston and Henderson; Houston, East and West Texas; Texas Western, and a branch of the Gulf, Colorado and Santa Fé railroads; 46 m. n.w. of Galveston, 150 m. e.s.e. of Austin. It is connected with Galveston harbor by a ship-canal built by the U. S. govt., and two railroads, the canal accommodating large steamships between Galveston and Clinton, 7 m. below Houston. The city contains 25 churches; public schools in which over 8,000 children of school age are enrolled; numerous private schools and academies; city hall and market-house (cost $400,000); masonic temple; large brick hotel erected on the site of the old capitol of the Tex. republic; 2 public libraries; daily, weekly and monthly publications; national and private banks; gas, telephone, electric light, water, and sewage systems; and 2 iron bridges spanning the bayou. Beside the machine-shops of the Texas and New Orleans and the Southern Pacific railroads, its industries comprise cotton-seed oil factories of large capacity, several cotton compresses, flour and grist mill with daily output of 1,100 barrels of flour and meal, plow factories, brass and iron foundries, cooperage shops, large brick manufactories, several beef-packing establishments, and car, wagon, agricultural implement, soap, Portland cement, and fertilizer factories. There are also extensive nurseries in the vicinity. Being the centre of the vast railroad system of Tex., Houston controls the

SAM HOUSTON.

trade of the rich grazing and agricultural country surrounding it, and does an extensive cotton business. It is also the seat of the annual state fairs. In 1900 there were 509 manufacturing establishments with an aggregate capital of $6,955,350, employing 4,587 persons, whose aggregate wages amounted to $2,409,250, the value of products being $10,641,575. The taxable valuation (1907) $42,000,000; municipal debt (1907) $3,919,000. Houston is tide-water point for 5,000 m. of railroad, exclusive of two Mexican lines; is laid out in broad streets; has excellent drainage, water-works, street railroads, and numerous artesian wells; and maintains an admirable system of public education. It was settled 1836, and was the cap. of the Tex. republic 1837. Pop. (1910) 78,-800.

HOUSTON, *hū'ston,* SAM: 1793, Mar. 2—1863, July 25; b. Rockbridge co., Va.: soldier and statesman. Soon after the death of his father, the family removed to Tenn., where he was adopted by a Cherokee Indian. In 1813 he enlisted in the 7th U. S. inf., and while serving in the Creek campaign attracted the attention of Gen. Jackson by his extreme bravery. The same year he was promoted sergt. and ensign, and 1814, May, 2d lieut. His acquaintance with the Cherokees led to his appointment as sub-agent at their reservation. He was promoted 1st lieut. 1818, Mar., resigning his commission May, began studying law at Nashville, June, and was licensed to practice in the following autumn. In 1819 he was elected dist.attor. of Davidson district, Tenn., was soon after appointed adj.gen. of the state, 1821 elected maj. gen., 1822 resigned the office of dist.attor., 1823-25 elected member of congress, and 1827 gov. of Tennessee. In 1829 he resigned his office, returned to the Cherokees, adopted their dress, made a trip to Washington in their interest, and lived with them till 1832, when he made a trip to Tex., and was unanimously elected delegate to the convention called to form a constitution, preliminary to the admission of the territory into the Mexican union. The Mexicans, disapproving the constitution, denied the petition for admission and ordered the surrender of Texan arms. The Texans resolved to resist the demand, elected Houston general for all the territory e. of Trinity river, and when the Mexicans under Santa Anna began preparing to invade Tex., Houston was chosen commander-in-chief of the whole territory. He organized a milit. force, was a member of the convention that declared the independence of Tex. 1836, Mar. 2; conducted the war against the invaders with great energy, and on Apr. 21, with only 750 men, fought the main div. of the Mexicans at San Jacinto and routed them with a loss of 630 killed and 730 prisoners, among the latter Santa Anna. The territory was then declared an independent republic, and Houston was elected its first pres. 1836, Oct. 22; and re-elected 1841. In 1838 he took the first

steps to secure the admission of Tex. into the American union; 1845 the act was accomplished; and 1846, Mar., he entered the U. S. senate, where he served till 1859. He was a candidate for the presidential nomination 1852 and '56, was defeated for gov. of Tex. 1857, and elected 1859, and after the secession of Tex. he was deposed for refusing to take the oath of allegiance to the Confederacy 1861, Mar. 18. He then lived in retirement till his death.

HOUT, n. *howt* [Dut.]: in *S. Africa*, wood. HOUT'-BERG, a timbered mountain.

HOVEL, n. *hŏv'ĕl* [originally an open shed supported on posts, sometimes a canopy over a statue: W. *hogl*, a hovel; AS. *hof*, a house: Dut. *huif*, a hood: Icel. *hof*, a temple, a hall: Ger. *hof*, a court, an area]: a shed; a mean habitation: V. to put into a hovel. HOV'ELING, or HOV'ELLING, imp. HOV'ELED, or HOV'ELLED, pp. *-ĕld.*

HOV'ELLERS. See DEAL BOATMEN.

HOVELLING, n. *hŏv'ĕl-ĭng:* process of carrying up two sides of a chimney higher than those less exposed to strong currents of air, in order to prevent it from smoking; or the leaving of openings in all the sides, so that when the wind blows over the top, the smoke may escape below: also the chimney so built.

HOVEN: disease affecting cattle and sheep; caused by eating large quantities of green food, which instead of being digested ferments and forms carbonic acid gas. The stomach is greatly distended, pain is intense, and severe cases, unless relief is speedily obtained, result fatally. In the early stages benefit is sometimes obtained by the administration of three or four drachms of chloride of lime in a small quantity of water. If more convenient, two-ounce doses of ammonia in a quart of water may be given every fifteen minutes. Pulverized charcoal in teaspoonful doses once in fifteen minutes gives relief in mild cases. The charcoal should be mixed with a tumbler full of milk or water to which a little molasses has been added. Copious injections of warm water are also beneficial. If relief is not soon obtained by milder methods, an opening must be made into the stomach to allow the escape of the gas. The trochar is used by surgeons, and is the best instrument, but if it cannot be readily obtained a sharp-pointed knife may be used. The opening must be on the left side, about three inches from the spine, and midway between the hip and the last rib. In order to avoid striking the kidney, the knife should pass obliquely in and downward. A quill or pipe-stem should be inserted in the opening. After the gas has escaped the quill should be removed, and the wound closed with a silk stitch or adhesive plaster. In order to remove the mass of undigested food, a smart purgative must be given. For a cow this should consist of twelve ounces of Epsom salts, one ounce of ginger, and four ounces of molasses, mixed with two quarts of water. For smaller

creatures the dose should be diminished. The animal should be lightly fed for at least a week after an attack. Hoven is easily prevented by changing from dry to green food gradually, and by allowing animals when first turned into rank grass or clover to remain only a short time.

HOVER, v. *hŭv'ėr* [W. *hofian*, to hang over: Dut. *huyveren*, to quiver, to shiver]: to hang fluttering over or about; to hang over; to stand in suspense; to wander about one place; in *OE.*, to stay; to wait for. HOV'ERING, imp.: ADJ. hanging over: N. the act or state of hanging in suspense. HOV'ERED, pp. *-ėrd.* HOV'ERINGLY, ad. *-lĭ. Note.*—HOVER apparently meant originally 'to abide; to dwell in;' thus derived from or connected with O.Fris. *hovia*, to receive into one's house: O.Dut. *hoven*, to entertain in a house. See SKEAT.

HOVEY, *hŭv'ĕ*, ALVAH, D.D., LL.D.: educator: b. Greene, N. Y., 1820, Mar. 5; d. 1903. He graduated at Dartmouth College 1844, and Newton Theol. Institution, Mass., 1848, and after filling a pastorate in a Bapt. church at New Grenada, Me., 1848-9, was called to Newton Theol. Institution (Bapt.), with which he was subsequently connected as asst. teacher of Hebrew 1849-55, and prof. of church history 1853-55, and was prof. of theol. and Christian ethics in 1855-99 and pres. in 1868-99. He was also a member of the executive committee of the American Bapt. Missionary Union 1868-83. His publications include a *Life of Rev. Isaac Backus* (1858); *The State of the Impenitent Dead* (1859); *The Miracles of Christ as attested by the Evangelists* (1864); *The Scriptural Law of Divorce* (1866); *God with Us, or the Person and Work of Christ* (1872); *Religion and the State* (1874); *The Doctrine of the Higher Christian Life, compared with the Teachings of the Holy Scriptures* (1876); *Manual of Systematic Theology and Christian Ethics* (1877, 80); and commentary on *The Gospel of John* in *The Complete Commentary on the New Testament*, of which he was general editor (1885). He received the degree D.D. from Brown Univ. 1856, and LL.D. from Denison Univ., Ohio, and Richmond College, Va., 1876.

HOVEY, ALVIN PETERSON: lawyer: b. Mt. Vernon, Ind., 1821, May 8. He received a common-school education, was admitted to the bar 1843, delegate to the state constitutional convention 1850, judge of the 3d judicial circuit of Ind. 1851-54, appointed judge of the state supreme court 1854, U. S. dist.attor. for Ind. 1856-58, served through the civil war, reaching the rank of brev. maj.gen. of vol., U. S. minister to Peru 1866-70, elected member of congress as a republican 1886, and gov. of Ind. 1888; d. 1891, Nov. 23.

HOVEY, RICHARD: American poet: b. Normal, Ill., 1864, May 4; d. New York, 1900, Mar. 24. He was graduated at Dartmouth 1885, went abroad and led a

bohemian life, being in turn actor, journalist, dramatist and poet, and finally, lecturer on English literature in Barnard College, New York. His verse was of the idealistic school and marked with the influence of Ibsen and Maeterlinck.

HOW, ad. *how* [AS. *hû;* Dut. *hoe;* Dan. *hvor;* O.Fris. *hu,* how]: in what manner; to what degree or extent; for what reason; in what state; by what means; used as an int., as 'how are the mighty fallen!' used as a noun, as 'the when, the *how,* and the wherefore.' HOWBE'IT, conj. *-bē'ĭt,* nevertheless; yet. HOW D'YE DO? in what state is your health? HOWEV'ER, ad. in whatsoever manner; at all events; at least; nevertheless; still. HOW'SO, ad. a familiar term of inquiry—why? in what manner is this? HOW'SOEV'ER, ad. in what manner soever; to whatever degree; nevertheless.

HOW, n. *how* [Icel. *haugr,* a mound: Sw. *hög,* a heap: Dan. *höi,* a hill]: a mound; a hill—chiefly in names of places.

HOW, n. *how,* also HAUGH, or HAUCH, n. *haw,* but in Scot. *gh* and *ch* are guttural [Gael. *auch,* or *augh,* a field: Icel. *hage,* a place for pasture]: in *Scot.,* any hollow place; a plain amidst rising grounds; low-lying flat grounds on river-sides.

HOW'ARD, HOUSE OF: family for centuries at the head of the English nobility. The Howards have held the dukedom of Norfolk since the middle of the 15th c., and have contributed to the annals of the nation several persons distinguished both in politics and in literature. Neither Sir W. Dugdale, nor Collins, nor Sir Bernard Burke claims for the Howards any more ancient origin than Sir WILLIAM HOWARD, learned chief justice of the common pleas under Edward I. and Edward II., though Dugdale incidentally mentions a tradition that their name is of Saxon origin, and derived either from an eminent office under the crown before the Conquest, or from Hereward, leader of those forces which for a time defended the isle of Ely so valiantly against William the Conqueror. Be this as it may, it is certain Sir JOHN HOWARD, grandson of the above-mentioned judge, was not only admiral and captain of the king's navy in n. England, but sheriff of Norfolk, in which county he held extensive property, which was subsequently increased by the marriage of his grandson, Sir ROBERT HOWARD, with the coheiress of the ancient and noble house of Mowbray, Dukes of Norfolk. The only son of this union was Sir JOHN HOWARD, one of the leading supporters of the House of York, who, having gained early distinction in the French wars of Henry VI., was constituted by Edward IV. constable of the important castle of Norwich, and sheriff of Norfolk and Suffolk. He subsequently became treasurer of the royal household, obtained 'a grant of the whole benefit that should accrue to the king by coinage of money

in the city and tower of London, and elsewhere in England;' and further, was raised to the peerage as Lord Howard and Duke of Norfolk. We find him 1470 made capt.gen. of the king's forces at sea, and he was most strenuous in that capacity in his resistance to the House of Lancaster. Finally, he was created Earl Marshal of England, an honorary distinction still borne by his descendants, and 1484 was constituted Lord Admiral of England, Ireland, and Aquitaine. He fell next year, however, on Bosworth Field, and, after his death, his honors were attainted, as also were those of his son THOMAS HOWARD, who had been created Earl of Surrey. The latter, however, after suffering three years of imprisonment in the Tower of London, obtained a reversal of his own and his father's attainders, and being restored to his honors accordingly, became distinguished as a general and is celebrated in history particularly for his defeat of the Scotch at Flodden 1513. His son THOMAS HOWARD, third Duke of Norfolk, was attainted by Henry VIII., though afterward restored in blood, and by his marriage with a daughter of King Edward IV., became the father of HENRY HOWARD, the ill-fated and accomplished Earl of Surrey, eminent as statesman, warrior, and poet, whose execution was the last of the many acts of tyranny which disgrace the memory of Henry VIII. See SURREY, HENRY HOWARD, Earl of.

The Earl of Surrey was beheaded during the lifetime of his father, on whom the same sentence had been passed, when the death of the royal tyrant saved him from the block. His grandson THOMAS HOWARD, fourth Duke of Norfolk, in like manner suffered attainder, and was beheaded on Tower Hill for high treason for his communication with Mary, Queen of Scots. The family honors, however, were again restored, partly by James I., to his grandson, and partly by Charles II. to his great-great-grandson, THOMAS HOWARD, who thus became eighth duke, and whose cousin and successor, CHARLES HOWARD, ninth duke, was the direct ancestor of the present Duke of Norfolk.

Without attempting a list of all the honors conferred on various branches of the ducal house of Howard, it is sufficient to say, that in one or other of their widespread branches, the Howards either have held within the last three centuries, or still hold, the earldoms of Carlisle, Suffolk, Berkshire, Northampton, Arundel, Wicklow, Norwich, and Effingham, and the baronies of Bindon, Howard de Walden, Howard of Castle Rising, and Howard of Effingham.

The ducal house of Norfolk has had the fate, beyond all others among the English nobility, to find its name interwoven with the thread of English history, and not rarely in colors of blood. The accomplished but unfortunate Surrey, and his scarcely less unhappy father, Thomas Howard, are 'household words' in English history.

HOWARD, Bronson: an American playwright; b. in Detroit, Mich., 1842, Oct. 7; took up journalism; and was connected with several newspapers in New York city, including the *Tribune, Post,* and *Evening Mail,* 1867-72. His plays include *Shenandoah; Wives; Young Mrs. Winthrop; Saratoga; Diamonds; The Banker's Daughter; Old Love Letters; Met by Chance; Peter Stuyvesant; Hurricane; One of Our Girls; Aristocracy; The Henrietta;* etc.

HOW'ARD, John: 'the philanthropist:' 1726-1790, Jan. 20; b. Enfield, where his father, a retired London merchant, had a country house. Howard inherited a considerable estate. In 1752 he married a motherly landlady, 53 years of age, who had nursed him through a severe illness. His wife died; and in 1756, the year of the great earthquake at Lisbon, urged by benevolence, as well as curiosity, he set sail for that city. On this voyage his vessel was taken by a French privateer, and he was confined for some time in French prisons. After his release he married again (1758). The hardships which he had undergone in his imprisonment, combined with the knowledge of prisons and the miseries of prison life which he acquired as high sheriff of the county of Bedford, 1773 and afterward, determined him to devote himself to prison reform. His second wife had died 1765; and his life thereafter is but a chronicle of his journeys throughout the United Kingdom and the continent, in which he visited the principal prisons and hospitals. Howard brought to light the frightful and almost universal abuses prevalent in prisons, lazarettos. and quarantine hospitals on the continent as well as in Britain. His investigations were untiring; he was a scrupulous gatherer of statistics bearing on his great object; and he pressed upon public attention and on the attention of governments the facts and the suggested reforms. He was not well educated, nor of an unusual intellectual power; and being a nonconformist he had no high social standing; and he was but a pioneer in a great wilderness. But he gathered the data for the future science of prison discipline; and his deeply religious devotedness to the cause of those who had none else to speak for them, combined with his personal aid to many unfortunates, stirred the heart of Europe. The name of this plain man—who expended his fortune, and gave his life for his suffering fellow-men,—remains an inspiration to benevolent reform. His chief work is *An Account of the Lazarettos in Europe, etc., with Remarks on the Present State of the Prisons in Great Britain and Ireland* (1789). He died at Kherson, in s. Russia, from infection from a fevered patient for whom he had prescribed.

HOW'ARD, John Eager: 1752, June 4—1827, Oct. 12: b. Baltimore co., Md.: soldier. He was the son of a wealthy planter, received a private-tutor education, entered the American army at the outbreak of the revolu-

tion, commanded a co. under Gen. Hugh Mercer in the battle of White Plains 1776, Oct. 28; commissioned maj. of the 4th Md. regt. 1776, Dec., engaged at Germantown and Monmouth; at Camden under Gen. Gates 1780; and at the Cowpens under Gen. Greene, where his bayonet charge won the day for the Americans, 1781; received a medal from congress; was gov. of Md. 1789-92, U. S. senator 1796-1803, appointed by Washington maj.gen. 1798, and was a candidate for vice-pres. 1816.

HOW'ARD, OLIVER OTIS, LL.D.: soldier: b. Leeds, Me., 1830, Nov. 8. He graduated at Bowdoin College 1850, and the U. S. Milit. Acad. 1854, entered the army as brev. 2d lieut. of ordnance, promoted 2d lieut. 1855, 1st lieut. 1857, was chief of ordnance in Seminole war, Fla., 1857, and asst. prof. of mathematics at the Milit. Acad. 1857, Sep.—1861, June 3. He resigned his regular army commission 1861, June 7, to accept the colonelcy of the 3d Me. vols., was in command of a brigade at Bull Run July 21, promoted brig.gen. of vols. for gallantry there Sep. 3, was twice wounded, and lost his right arm at Fair Oaks 1862, June; rejoined the army 1862, Sep., and was present at Antietam and Fredericksburg, and promoted maj.gen. of vols. 1862, Nov. In 1863, May, he commanded the 11th army corps at Chancellorsville, and July at Gettysburg; in Oct. was transferred with his command to Tenn., was at Lookout Mountain and Missionary Ridge, and on the expedition to relieve Knoxville. On the consolidation of the 11th and 12th corps into the 20th (1864, Apr.), he was assigned to command the Army of the Cumberland (4th corps), and in July the Army of the Tennessee. He took part in the invasion of Ga., the battles at Dalton, Resaca, Adairsville, and Pickett's Mill, where he was again wounded, the investment of Atlanta, pursuit of the Confederates under Gen. Hood into Ala., the march to the sea, in which he commanded the right wing of the grand army, and the movement culminating in the surrender of Gen. J. E. Johnston 1865, Apr. 26. He was promoted brig.gen. U.S.A. 1864, Dec. 21, brevetted maj.gen. 1865, Mar.; commissioner of the Freedmen's Bureau (q.v.) 1865, Mar.—1874, July; assigned to command Dept. of the Columbia 1874, conducted the expeditions against the Nez Perces Indians 1877 and the Bannocks and Piutes 1878; supt. U. S. Milit. Acad. 1881-2, promoted maj.gen. U.S.A. and assigned to command the Div. of the Pacific 1886, and transferred to the Div. of the Atlantic 1888, Dec. 12; retired from active service 1894, Nov. 8. He received the degree LL.D. from Waterville College, Me., 1865, Shurtleff College 1865, and was appointed a chevalier of the Legion of Honor by the French govt. 1884.

HOW'ARD UNIVER'SITY: at Washington, D. C.; established by act of congress 1867, and named in honor of Gen. Oliver O. Howard, one of its founders, and its pres. 1867-73. Though originally planned to afford su-

perior education to colored students, it is now open to all applicants irrespective of race or sex. The institution comprises 9 buildings and maintains 7 departments—theol., medical, law, collegiate, preparatory, normal, and industrial. The building and grounds were provided by the federal govt., which also pays a portion of the annual expenses of maintenance. 1904, Jan. 1, the univ. had 90 instructors, 850 students and 45,000 vols. in its library and was under the presidency of Wilbur P. Thirkield, D.D., who succeeded Jeremiah Eames Rankin, D.D. (Congl.). Under these administrations the usefulness of the institution has greatly increased. It also possessed a notable mineralogical cabinet, museum of coins, medals, Indian relics, and curios, and a valuable collection of war pictures and portraits. The value of grounds and buildings is over $5,000,000. About two-thirds of the students are colored, but the majority of those in the medical dept. are white.

HOWDAH, or HOUDAH, n. *how'dă* [Hind. *haudah;* Ar. *hawdaj,* a litter carried on a camel, for the accommodation of Arabian ladies travelling]: a seat fixed on the back of an elephant.

HOWDY, or HOUDIE, n. *how'dĭ:* in *Scot.,* a midwife.

HOWE, *how,* ELIAS: 1819, July 9—1867, Oct. 3; b. Spencer, Mass.: inventor. He was brought up on the farm and in the mill of his father, attended local schools in winter, learned the machinist's trade in Lowell and Boston, and after 5 years' experimenting under discouraging circumstances, perfected his invention of the sewing-machine 1845, and received his first patent 1846. Unable to command the means of manufacturing or overcoming the opposition to labor-saving devices, he worked some time as a railroad engineer; then visited England in the hope of bringing his machine into notice, and while there sold his rights to it in that country and adapted it to corset, umbrella, and valise making; and returning home as a common sailor, found that his invention had been imitated and put in the market in his absence. Friends then enabled him to seek his rights in the courts, and in 1854 the validity and priority of his patents were fully established. Subsequently he acquired wealth, received many medals, including the gold one of the world's fair at Paris 1867, and was awarded the cross of the Legion of Honor by the French government.

HOWE, *how,* JOHN: one of the most eminent later Puritan divines, called the *Platonic Puritan:* 1630, May 17—1706, Apr. 2; b. Loughborough, in Leicestershire, to the living of which parish his father had been presented by Abp. Laud. He studied both at Cambridge and Oxford, and after preaching at Winwick, Lancashire, and Great Torrington, Devonshire, was appointed domestic chaplain to Cromwell 1656, in which difficult situation his conduct was such as to win praise even from the

enemies of his party. He was of a tolerant and gentle spirit, and as Cromwell's almoner and confidential friend, gave help to many prominent Episcopalian clergymen. At the Restoration, he returned to Torrington, where the position that he had held during the Commonwealth made him an object of close suspicion to the government. The *Act of Uniformity*, however, ejected him from his parish 1662, Aug. 24, and he wandered about preaching in secret till 1671. Pressed by want, he published a book, *The Blessedness of the Righteous*, which occasioned his invitation by Lord Massarene, of Antrim Castle, in Ireland, to become his domestic chaplain. Having the friendship of the bishop of that diocese, and liberty to preach in all the churches under his jurisdiction, he wrote his *Vanity of Man as Mortal*, and began his greatest work, *The Good Man the Living Temple of God* (1676-1702), which occupies one of the highest places in Puritan theology. In 1675, he was called to be pastor of the dissenting congregation in Silver Street, London, and went thither in the beginning of 1676. In 1677 he published, at the request of Mr. Boyle, *The Reconcilableness of God's Prescience of the Sins of Men with the Wisdom of His Councils and Exhortations;* in 1681, *Thoughtfulness for the Morrow;* in 1682, *Self-dedication;* in 1683, *Union among Protestants;* and in 1684, *The Redeemer's Tears wept over Lost Souls.* In 1685, he was invited by Lord Wharton to travel with him on the continent; and after visiting the principal cities, he resolved, owing to the state of England, to settle for a time at Utrecht, where through the influence of his friend Burnett, afterward Bp. of Salisbury, he was admitted to several interviews with the Prince of Orange. In 1687, the *Declaration for Liberty of Conscience* issued by James II. induced him to return to England, and at the Revolution next year he headed the deputation of dissenting clergymen when they brought their address to the throne. Besides smaller works, he published, 1693, *Carnality of Religious Contention;* 1694-5, several treatises on the Trinity; 1699, *The Redeemer's Dominion over the Invisible World;* and he continued writing till 1705, when he published *Patience in Expectation of Future Blessedness.* He died in London. Howe had large tolerance of spirit, deep religious fervor, a cultured breadth of view, and a style which combined the Puritan stateliness with an unusual gracefulness. Consult Henry Rogers's *Life and Character of John Howe, with an Analysis of his Writings.*

HOWE, JULIA WARD: author and lecturer: b. New York, 1819, May 27; daughter of Samuel Ward. She received a thorough private education, wrote several plays and poems, married Samuel Gridley Howe, M.D., 1843, mastered the German, French, Italian, Greek, and Latin languages; studied the philosophy of Kant, Spinoza, and Comte; and with her husband conducted an anti-slavery paper, the Boston *Commonwealth*, 1851-53. In 1861,

under the inspiration of the mustering of the troops at the national capital, she wrote the famous *Battle-Hymn of the Republic;* and with her husband labored assiduously through the war to promote the interests of the soldiers and the freedmen. She was a founder of the New England Women's Suffrage Club 1869, and the Women's Peace Asso. (London, England), 1872, and pres. of the women's branch of the New Orleans cotton exposition 1884-5. She has preached frequently from Unit. pulpits in the United States, and has been a popular platform lecturer in this country and abroad. Her publications include (poems) *Passion Flowers* (1854), *Words for the Hour* (1857), and *Later Lyrics* (1866); (dramas) *The World's Own* (1855), and *Hippolytus* (1858); *A Trip to Cuba* (1860); *From the Oak to the Olive* (1868); *Sex and Education* (1874); *Modern Society* (1881); and *Life of Margaret Fuller* (1883); *Reminiscences* (1899); *Sketches of Representative Women of New England* (1905).

HOWE (Richard Howe), Earl: 1725-1799, Aug. 5: British admiral: second son of Emanuel Scrope, second Viscount Howe of the Irish peerage. He was educated at Eton. Having a boyish passion for the sea, he left Eton at the age of 14, and went to the South Seas in the squadron under Anson. He was with Admiral Vernon 1745, and at the time of the Scottish rebellion, being in command of the sloop *Baltimore,* took part in the siege of Fort William. He also, with another vessel, beat off two French ships conveying troops and ammunition to the Pretender, for which he was made post-captain. In 1755, his ship, the *Dunkirk,* captured the *Alcide,* a French 64, off Newfoundland. He next served under Sir E. Hawke in the expedition against Rochefort. He was ordered to attack the fort on the isle of Aix with his ship the *Magnanime;* compelled it to surrender after an hour's cannonade, and achieved the only material success of the expedition. He was commodore of the squadron which sailed 1758 for St. Malo. The troops were landed and re-embarked without loss, after destroying all the magazines and the shipping in the port to the number of 120 sail. In the same year he took Cherbourg. Nearly 200 pieces of iron cannon and mortars were here rendered unserviceable; the brass cannon were brought to England; the celebrated basin was destroyed, and twenty ships and vessels were burned or sunk. A second attack upon St. Malo was less successful. The French troops assembled in force at the Bay of St. Cas, and it was only by the intrepidity of Howe, who went in his own barge into the centre of the enemy's fire, that the re-embarkation of the rear-guard was effected, with great loss of life. In 1758, he succeeded to the Irish title of viscount on the death of his brother, the brigadier-gen. in the old French war in America, who was killed before Ticonderoga. Howe took part in the defeat of the fleet under

the Marquis de Conflans, and captured the *Hero*, 74 guns. In 1760, he was made col. of the Chatham division of marines, and afterward a lord of the admiralty, and treas. of the navy. In 1776, he commanded a fleet on the American coast, when the conquest of New York, Rhode Island, Philadelphia, and every settlement within the reach of a naval force, testified to his skill and energy. In 1778, he defended the American coast against a superior French naval force under D'Estaing. He was made a viscount of Great Britain 1782, and sent out with a fleet to relieve Gibraltar. He succeeded in disembarking troops, ammunition, and supplies, and then offered battle to the combined fleets of France and Spain, which declined an engagement. He was made first lord of the admiralty 1783, and received an English earldom 1788. When war with France broke out, 1793, he took command of the Channel fleet, and next year gained the victory in the Bay of Biscay, which will long be known as that of 'the glorious first of June.' The French fleet consisted of 26 ships of the line, and the English of 25. Howe, in his flag-ship, the *Queen Charlotte*, engaged, off Ushant, the French admiral, who in less than an hour crowded all the sail he could carry, followed by as many of his ships as could retreat. The English captured two ships of 80 guns, and four 74's; another 74 sank immediately after she was taken possession of. London was illuminated three nights in honor of the victory. The thanks of parliament were voted to Howe. George III. visited him on board the *Queen Charlotte*, gave him a sword, and made him a knight of the Garter. His last service was in bringing back the mutinous seamen at Portsmouth to their duty 1797.

HOWE, Samuel Gridley, M.D.: 1801, Nov. 10—1876; b. Boston: philanthropist. He was educated at the Boston Latin School, and Brown Univ., graduating 1821. He then studied medicine. Being an admirer of Lord Byron, he wished to join him in aiding the Greek revolution, and embarked from Boston for Greece 1824; volunteered as a surgeon; served two years as a guerrilla; organized the medical staff of the Greek army, and was appointed its chief. The Greeks were suffering for supplies, and even for food; and he went to America, and raised large contributions. Returning with food, clothing, and supplies, he formed the colony of Corinth, in which he filled all offices, from governor to constable. Taken down with the swamp-fever, 1830, he went to Paris, where he attended medical lectures, and 1832 returned to the United States. Having become interested in the education of the blind, he was sent to Europe, to examine the best institutions, but volunteered in the Polish insurrection, and spent six weeks in a Prussian prison. On his return, the Massachusetts Institution for the Blind was established, and placed under his management. He also established a successful school for idiots; and 1828 published *Sketch of*

the Greek Revolution. He revisited Greece 1867, bearing supplies to the Cretans, then struggling for their independence.

HOWE, Sir WILLIAM: 1729, Aug. 10—1814, July 12; b. England: naval officer. He was educated at Eton College, Cambridge, entered the royal dragoons at an early age, commanded the light inf. under Gen. Wolfe at Quebec 1759, was commissioned col. of the 4th foot 1764, promoted maj.-gen. 1772, and succeeded Gen. Gage as commander-in-chief of the British forces in America 1775. He evacuated Boston 1776, Mar.; defeated the Americans at Long Island, Aug.; took possession of New York Sep. 15, gained the battles of White Plains Oct. 28, Fort Washington Nov. 16, and Brandywine 1777, Sep. 11; occupied Philadelphia Sep. 26, repulsed Washington at Germantown Oct. 4, and was succeeded by Sir Henry Clinton 1778, May. Returning to England he was promoted lieut.-gen. 1782, gen. 1786, and raised to the peerage of Ireland, 1799.

HOW'ELL, CLARK: American journalist and politician; b. Barnwell county, S. C., 1863, Sept. 21. He was graduated from the University of Georgia in 1883, entered journalism, became managing editor in 1889 of the Atlanta *Constitution,* and editor-in-chief 1897. He was a member of the Georgia House of Representatives 1890-1 and has been a member of the Georgia Senate from 1900.

HOWELLS, WILLIAM DEAN: author, poet, and essayist; b. Martin's Ferry, Ohio, 1837, March 1. He learned the printer's trade and the business of conducting a newspaper early in life from his father; in 1851 worked as a compositor in Columbus, O., and five years later was the accredited correspondent of the Cincinnati *Gazette* at that place; in 1859 became news editor for the Ohio *State Journal,* and about the same time published his first volume of poems, besides furnishing a number of poems to the *Atlantic Monthly:* during the campaign of 1860 wrote the *Life of Lincoln,* and the following year was appointed U. S. Consul at Venice, where he remained until 1865, during which time he wrote *Venetian Life* (1866), and *Italian Journeys* (1867). After his return to America he was connected in an editorial capacity with the New York *Times,* and the *Nation,* and in 1866 became assistant editor of the *Atlantic Monthly,* being promoted to editor-in-chief in 1872; from 1886-92 he conducted the 'Editor's Study' Dept. of *Harper's Magazine;* for a short time during the latter year was editor of the *Cosmopolitan Magazine,* and later contributed to the *North American Review.* Among his works are: *Their Wedding Journey* (1871); *A Chance Acquaintance* (1874); *A Foregone Conclusion* (1875); *The Lady of the Aroostook* (1879); *The Undiscovered Country* (1880); *Doctor Breen's Practice* (1882); *A Modern Instance*

(1882); *A Woman's Reason* (1883); *The Rise of Silas Lapham* (1885); *Indian Summer* (1886); *The Minister's Charge* (1886); *April Hopes* (1887); *A Hazard of New Fortunes* (1889); *The Shadow of a Dream* (1890); *An Imperative Duty* (1892); *The Quality of Mercy* (1892); *The World of Chance* (1893); *The Coast of Bohemia* (1893); *A Traveller from Altruria* (1894); *The Landlord at Lion's Head* (1897); *An Open-Eyed Conspiracy* (1898); *The Story of a Play* (1898); *Ragged Lady* (1899); and *Their Silver Wedding Journey* (1900). Howells has also written farces and comedies, including: *The Sleeping Car* (1883); *The Mouse-Trap* (1897); *The Unexpected Guests* (1898); and *The Albany Depot* (1898); etc., and the following volumes of verse: *Poems of Two Friends* (1860), with J. J. Piatt; *No Love Lost, a Romance of Travel* (1868); *Poems* (1873); *Stops of Various Quills* (1895). His other works include: *Tuscan Cities* (1885); *Modern Italian Poets; Essays and Versions* (1887); *Criticism and Fiction* (1891); *Impressions and Experiences* (1896); *Literary Friends and Acquaintance* (1899); *Heroines of Fiction; The Kentons* (1902); *Literature and Life* (1902); *The Son of Royal Langbrith* (1903); *Miss Bellard's Inspiration* (1905); *London Films* (1905), etc.

HOWITT, *how'it*, WILLIAM AND MARY: husband and wife; joint English authors: WILLIAM HOWITT 1795-1879, Mar. 3; b. Heanor, in Derbyshire: MARY HOWITT, b. (Mary Botham), at Uttoxeter, 1799, Mar 12; d. Rome 1888, Jan. 30; married WILLIAM HOWITT 1823. William Howitt was educated at various schools in connection with the Society of Friends, to which persuasion his family belonged, as also that of his wife. *The Forest Minstrel,* with their joint names on the title-page, was published in the year of their marriage. For three or four years thereafter, they employed themselves in contributions to annuals and magazines, and 1827 a selection from these fugitive pieces appeared under the title of *The Desolation of Eyam.* From this date till 1837, William Howitt wrote *The Book of the Seasons, Popular History of Priestcraft,* and *Tales of the Pantika.* During the same period, Mary Howitt produced *The Seven Temptations;* and a country novel, *Wood-Leighton.* In 1837, William and Mary Howitt removed to Esher, in Surrey, and at that place William Howitt wrote *Rural Life in England, Colonization and Christianity, Boys' Country Book,* and *Visits to Remarkable Places,* first series. Mary Howitt at the same time employed herself in writing *Tales for Children,* many of which are popular. In 1840, William Howitt, with his wife and family, removed to Heidelberg, where they resided two years. Mary Howitt made herself mistress of the northern languages, and translated the works of Miss Bremer and Hans C. Andersen. Meanwhile William Howitt wrote and translated novels; he also published *The Aristocracy*

of England; and *The Homes and Haunts of the British Poets.* In 1852 he went to Australia, where he remained two years; and the works which he issued as a result were very popular, giving information of that then unknown land. In the last years of his life, his wife and he lived in Italy, and William died at Rome. Both in later years became believers in spiritism. Among William's later works are: *Land, Labor, and Gold, or Two Years in Victoria; The Ruined Abbeys of Great Britain; The Northern Heights of London; The Illustrated History of England,* 6 vols., completed 1861; *History of the Supernatural in all Ages and Nations* (1863); *Discovery in Australia, Tasmania, and New Zealand* (1865); and *The Mad War Planet and other Poems* (1871).

HOWITZER, n. *hŏw'ĭts-ėr* [Gr. *haubitze*]: short mortar or gun mounted on a field-carriage, used for throwing shells. As, for this purpose, no great range is necessary, a small charge of powder suffices; and the Howitzer can be made, in proportion to its large bore, extremely light. It combines in some degree the accuracy of a cannon with the calibre of a mortar; and while equally effective at short ranges, is far more portable than either. That the powder, on its expansion, may act with full force on the shell, it is confined in a hemispherical chamber of smaller diameter than the rest of the bore, the mouth of which is completely closed by the shell when rammed home.

HOWKER, n. *how'ker* [Dut. *hocker*]: a Dutch vessel with two masts; a one-masted fishing-boat same as HOOKER.

HOWL, n. *howl* [OF. *huller* and *uller,* to howl—from L. *ŭlŭlārĕ,* to shriek, to howl—from *ŭlŭlă,* an owl: Ger. *heulen;* Dut. *huylen;* Gr. *hulain,* to howl]: the cry of a dog or wolf; a piercing cry, arising from pain or fear: v. to cry as a dog or wolf; to utter cries of terror or anguish; to roar or screech loudly, as the wind. HOWL'ING, imp.: ADJ. filled with howling beasts, as a howling wilderness; producing screeching or screaming sounds, as a tempest; dreary: n. loud outcries or mournful sounds. HOWLED, pp. *howld.* HOWL'ER, n. *-ėr,* one who howls; a monkey so named.

HOWL'ER, or HOWL'ING MONK'EY, or STEN'TOR (*Mycetes*), *Alouatte* of the French: genus of monkeys, in the n.e. parts of S. America, remarkable for dilatation of the Hyoid (q.v.) bone into a hollow drum, which communicates with the larynx, makes a conspicuous external swelling of the throat, and gives prodigious power to the voice, enabling these animals to emit hideous sounds which are heard miles away. They live chiefly among branches of trees, and take extraordinary leaps from one to another, taking hold by the tail as readily as by the hands, and often swinging by it alone. They are gregarious, and unite their voices in concert, so as to pro-

duce a most deafening noise. The monkeys of this genus, the largest monkeys in the new world, are regarded as in their low intelligence and their fierceness of disposition American representatives of the baboons, while in many of their habits they more nearly accord with the gibbons of the old world. There are not many species.

HOWLET, n. *how'lĕt* [F. *hulotte*—dim. from L. *ŭlŭlă*, an owl (see HOWL)]: a bird of the owl kind.

HOWLEY, MICHAEL FRANCIS: Canadian ecclesiastic; b. 1843. In 1857 he entered Saint Bonaventure's College, and in 1863 went to Rome, entering Propaganda as an ecclesiastical student. In 1868 he was ordained a priest and went to Scotland as secretary to Most Rev. Dr. Ayre, but in 1870 returned to Rome with Dr. Ayre and was present on the occasion of the declaration of the dogma of papal infallibility by Pope Pius IX. He accompanied the Rt. Rev. Thomas J. Power to Newfoundland in 1870, and for over 30 years he has labored with great success for the spiritual and ecclesiastical advancement of Newfoundland. In 1886 he was made prefect apostolic of Saint Georges, in 1892 was consecrated bishop in Saint John's and made vicar apostolic of Saint Georges, in 1902 appointed bishop of Saint John's in succession of Rt. Rev. Dr. Power, and in 1904 he was named by the Holy See archbishop of the ecclesiastical province of Newfoundland. Archbishop Howley is not only distinguished as a theological scholar and thinker, a devoted missionary and able preacher, but also as a poet, lecturer, and antiquary. He has also contributed much to the historical study of Newfoundland.

HOWTH, *hōth:* small peninsula on the e. coast of Ireland, forming the n. shore of the Bay of Dublin. It is two and a half m. long by about two m. broad, with an area of about 2,600 acres. Howth is connected with the mainland by a low and narrow isthmus, and its insular appearance greatly enhances the picturesque effect of Dublin Bay.

HOX, v. *hŏks:* in *OE.*, another spelling of HOCK, which see; to hamstring. HOX'ING, imp. HOXED, *hŏkst.*

HOX'IE, VINNIE REAM: American sculptor; b. Madison, Wis., 1846, Sept. 23. She was educated at Christian College, Columbia, Mo., and going to Washington, D. C., studied art, executed busts of Grant, Sherman and others, and a statue of Lincoln for the National Capitol. She then went abroad, where she designed medallions of Doré, Liszt, Buchanan, Read, and others. Among other works of hers are ideal statues of *Sappho; The Spirit of the Carnival;* and the statue of Admiral Farragut in Farragut Square, Washington. She was married to Major R. L. Hoxie of United States Engineers.

HOY, n. *hoy* [Dut. *huy* and *heu;* F. *heu*]: a large boat, or small vessel, sometimes with one deck; differing little from a small sloop or smack.

HOY! int. *hoy* [Dut. *hui,* hoy! come!]: in *sea-faring terms,* when one ship hails another, the exclamation is 'What ship, hoy?' that is, 'Tell us how you are and whither bound;' stop! stay!

HOY: one of the Orkney Islands, s.w. from Pomona, or the Mainland, from which it is separated by a passage about 2 m. in width. It is 14 m. long and 6 m. broad, and its population in 1881 was 1,380. Unlike the most of the islands of its group, Hoy rises abruptly from the sea, with precipitous cliffs 1,000 ft. in height fronting the w.; the highest eminence, Wart Hill, is 1,555 ft. above sea-level. It has in the s. the harbor of Long Hope, said to be the finest in the Orkneys, and defended by a fort and two martello towers. Among the curiosities of the island is the Dwarfie Stone, a block of sandstone, 22 ft. long, 17 ft. broad, and 7 ft. high. One end of it has been hollowed out by iron tools, the marks of which are visible, and a kind of apartment formed. In the s.w. of the island is the Old Man of Hoy, a pillar of rock 300 ft. in height.

HOYA, n. *hŏy'ă* [after *Hoy,* gardener to Duke of Northumberland, died 1821]: genus of tropical plants of the order *Asclepiadaceæ,* having a 5-cleft wheel-shaped corolla, and a 5-leaved spreading fleshy corona. Some of the species are common in hothouses, and from the appearance of their flowers, they are called *Wax-plants.*

HOYDEN. See HOIDEN.

HOYLE, EDMOND: English writer on games; b. 1672; d. London 1769, Aug. 29. It is said that he was educated for the law, but nothing definite is known of his career except that he was for many years in London a writer on and instructor in games. His *Short Treatise on Whist* (1742), a compendium of the laws of the game and many rules for play, sold largely and has been the basis of all subsequent manuals of the kind. So generally has his authority been accepted in the game that 'according to Hoyle' has attained a proverbial significance.

HOYT, CHARLES HALE: American dramatist; b. Concord, N. H., 1860; d. 1900. He was at one time musical and dramatic critic of the *Post* of Boston. His works comprise *A Midnight Bell* (1887), and a long series of farce-comedies, such as *A Trip to Chinatown* (1890).

HOYT, HENRY MARTYN: American lawyer and soldier; b. Kingston, Pa., 1830, June 8; d. Wilkesbarre, Pa., 1892, Dec. 1. He was graduated from Williams College in 1849, read law, was admitted to the bar in 1853, practised at Wilkesbarre, at the opening of the Civil War was appointed lieutenant-colonel of 52d Pennsylvania regiment, served during the Peninsular campaign in 1862, and was captured in a night attack on Fort Johnson during the siege of Morris Island. Mustered out with the grade of brevet brigadier-general; he practised his profession until 1867, and was then appointed additional law-judge of

the Luzerne County courts. In 1879-83 he was Republican governor of Pennsylvania. His administration was particularly characterized by a wise financial policy, by means of which the State debt was reduced to $10,000,000 and refunded at 3 per cent. He published: *The Controversy Between Connecticut and Pennsylvania* (1879); *Protection v. Free-Trade* (1885).

HOYT, JOHN WESLEY: American educator; b. near Worthington, Ohio, 1831, Oct. 13. He was graduated at Ohio Wesleyan University in 1849, and later studied both medicine and law. He has had charge of educational exhibits in several international expositions, and was made chairman of the National Committee to Promote the Establishment of the University of the United States. He was the first president of the University of Wyoming, and was governor of Wyoming, 1878-83. He has published *Progress of University Education; Studies in Civil Service;* etc.

HOYT, WAYLAND: American Baptist clergyman and author; b. Cleveland, Ohio, 1838, Feb. 18. He was educated at Brown University and studied for the Baptist ministry at the Rochester Theo. Sem. Since then he has held pastorates at Pittsfield, Mass., Cincinnati, Brooklyn, Minneapolis, and Philadelphia. Among his published works are *Hints and Helps for the Christian Life* (1880); *Gleams from Paul's Prison* (1882); *Light on Life's Highway* (1890).

HRDLICKA, ALES: American anthropologist; b. Humpolec, Bohemia, 1869, March 30. He obtained an academic education in Bohemia, graduated in medicine from the New York Eclectic College 1892, and from the New York Homœopathic College in 1894, and studied abroad in 1896. He made many investigations among the insane and other defectives during the years 1894-99; from 1898 to 1905 accompanied several anthropological expeditions to Mexico and southwestern United States, was physical anthropologist to the Hyde expedition 1899-1904; and since 1904 has been assistant curator of the United States National Museum in charge of the division of physical anthropology, and an editor of *The American Naturalist.* He has written *Report on Anthropological Work in the State Institute for Feeble-Minded Children* (1898); *Anthropological Investigations on One Thousand White and Colored Children* (1899); *The Eskimo Brain* (1901); etc.

HUAHEINE, *hô-â-hē'nā:* most easterly of the Society Islands (q.v.).

HUALLAGA, *wăl-yâ'gâ:* river of Peru, rising on the e. side of the Andes, near lat. 11° s., 13,200 ft. above the sea. After a northerly course of about 500 m., with many considerable falls, it enters the Amazon.

HUAMANGA, *wá-mân'gâ* (now called AYACUCHO): city of Peru, dept. of Ayacucho, on an affluent of the

Apurimac. It was founded by Pizarro 1539, on the route between the old and new capitals of the country, Cuzco and Lima. It has a cathedral and a university. Near Huamanga, 1824, Dec. 9, was completed the independence of Spanish America, by the decisive victory of General Sucré, leading the combined forces of Peru and Colombia (the latter then comprising Ecuador, New Granada, and Venezuela) which defeated the last Spanish army ever seen on the new continent. Pop. abt. 25,000.

HUA'NACA. See GUANACO.

HUANCAVELICA, *wân-kâ-vā-lē'-kâ:* town of Peru, about 80 m. w.n.w. of Huamanga, 160 m. s.e. of Lima; 12,400 ft. above the sea, on the e. declivity of the Andes. Its inhabitants work the neighboring mines of gold, silver, and quicksilver. Pop. abt. 4,000.

The *department* of Huancavelica is in the interior of Peru, s.e. of the dept. of Lima; 10,814 sq. m.; mountainous and unfruitful. Quicksilver is produced. Pop. 223,796.

HUANUCO, *wâ'-nô-kō:* town of Peru, on an affluent of the Huallaga (q.v.), also named Hunauco; on the e. declivity of the Andes, 180 m. n.n.e. of Lima. It is one of the most ancient places in the country. Pop. 5,300.

The *department* of Huanuco is n. of the dept. of Lima; it has a rugged surface, healthful climate, and fertile soil; area more than 13,000 sq. m. Pop. 145,309.

HUARAZ, or HUARAS, *wâ-râs':* small town of Peru, in a valley of the Andes, on the right bank of the river Santa, 150 m. s.e. of the seaport of Truxillo. Pop. 6,000.

HUB, n. *hŭb* [OE. *hob*, a false step: Dut. *hobbelen*, to rock as a boat]: a block of wood laid to the wheel of a carriage to stop its motion; the projecting nave of a wheel; the hilt of a weapon.

HUB. See HOB.

HUB'BARD, *hŭb'ärd*, ELBERT: American author; b. Bloomington, Ill., 1859. After working on a farm as a boy, he went to Chicago, where he entered a printing-office, and later was employed in a soap factory. In the latter business he rose to be manager, and finally partner of the firm; selling out his interest, he devoted himself for a time to study and travel, and finally settled at East Aurora, where he established the Roycroft shop, devoted mainly to the artistic printing and binding of books. The organization of the shop is co-operative, and its ideal is for every worker to do that which best expresses his own individuality. Hubbard is editor of the *Philistine*, a magazine of protest, and has written *Little Journeys* (biographical sketches); *No Enemy but Himself; Message to Garcia* (1898); and *Time and Chance* (1901); *The Man of Sorrows* (1904).

HUBBARD, LEONIDAS, JR.: American journalist, writer, and explorer; b. Waldron, Mich., 1872, July 2;

d. Labrador 1903, Oct. 18. He was a teacher in the public schools at Angola, Mich., while still in his teens, and early in life showed keen interest in writing, exploration, and athletics. Graduated from University of Michigan in 1897. He at once began reportorial work in Ann Arbor, and later on the Detroit *Evening News*. He came to New York in the summer of 1899 and attached himself to the staff of the *Daily News*, but early in 1902 became associate editor of *Outing*, in which work he was much interested. He conceived the idea of exploring into the wilds of Labrador, and 1903, June 20, accompanied by Dillon Wallace, a New York lawyer, and George Elson, a Cree Indian guide, he left New York, going by steamer from Saint Johns, N. B., to Rigolette, a Hudson Bay trading post on the Grand River. From this point Hubbard and his friends traveled by canoe and on foot, mapping correctly for the first time Grand Lake; then penetrating the interior in a westerly and northwesterly direction, mapping the course of the Beaver River from its source to the point where it flows into the southeast bay of Lake Michikamau; and locating and mapping several large lakes in the interior. The party penetrated some 250 miles further into new territory than any previous expedition. Notes on the geology and general observation of the topography of the country were also made. Among Mr. Hubbard's most noted writings are: *The Moonshiner at Home* (1902); *Barataria* (1902); *Children of the Bush* (1903); and *Where Romance Lingers* (1904).

HUBBARD, William: 1621-1704, Sep. 14; b. England: Congl. minister. He came to America 1630, graduated at Harvard College 1642, was ordained 1665, was pastor of the Congl. church at Ipswich, Mass., 1665-1703, and pres. of Harvard College, 1688. He was author of *The Present State of New England* (1677); *Memoirs of Maj.-Gen. Denison* (1684); a *History of New England* (pub. by the Mass. Hist. Soc. 1815); *Sermons* (1684), and *Testimony of the Order of the Gospel in Churches* (1701).

HUBBARDTON, *hŭb'ėrd-ton:* town in Rutland co., Vt., 48 m. s.w. of Montpelier; scene of a battle between the British under Gen. Fraser and the rear-guard of the American army, that had been forced to evacuate Fort Ticonderoga 1777, July 6, under Cols. Warner, Francis, and Haile. The Americans, surprised, July 7, by an overwhelming force of the British, which was reinforced during the engagement, were defeated after several brilliant charges, and forced to retire. The British loss was heavy. A commemorative monument was erected on the field 1859, July 7. Pop. (1910) 455.

HUBBUB, n. *hub'bub* [a repetition of hoop, representing a cry: AS. *wóp,* an outcry: comp. Gael. *uabhan,* fright, terror]: a great noise of many confused voices; an uproar; a tumult.

HUBER, *hô'bėr*, F. *übär'*, FRANCOIS: 1750, July 2—1831, Dec. 21; b. Geneva: Swiss naturalist. At an early age he lost his eyesight, and some years after this, married a Mademoiselle Lullin, by whose assistance, and that of an intelligent domestic, named Burnens, he made a vast variety of original and important observations on the habits of bees, which did much to correct the errors and imperfections of previous writers. Huber's first work was entitled *Lettres à Ch. Bonnet* (1792), reprinted, 1796, again, 1814, under the title *Nouvelles Observations sur les Abeilles.* In his latter years Huber derived important aid in his studies from his son Pierre (1777-1840), author of a valuable treatise on the *Habits of Ants,* and of several able memoirs relating to Zoology and Meteorology, in the Mem. Soc. Genève, 1820-30.

HUBER'TUSBURG: royal hunting-seat, not far from Leipzig, built 1721 by Augustus III., then prince, afterward king and elector. It was much injured during the Seven Years' War, and has historic celebrity for the treaty by which that war was ended, called the Peace of Hubertusburg, signed here 1763, Feb. 15, by the representatives of Prussia, Austria, and Saxony. By it the position of Prussia was established among the great powers of Europe. Maria Theresa relinquished all claim to the provinces which had been acquired by Prussia; and Frederick the Great restored his electorate to the king of Poland, elector of Saxony.

HUBNER, *hüb'nėr*, RUD. JUL. BENNO: 1806, Jan. 27—1882, Nov.; b. Oels, Silesia: eminent painter of the modern German school. He attracted attention first by his picture *Ruth and Boaz.* In 1839, he settled at Dresden, where he was director of the picture gallery, 1871-82. His principal productions are: *Samson Overthrowing the Pillars of the Temple, The Departure of Naomi, Christ and the Evangelists, Job and his Friends, The Lovers of the Canticles, Happiness and Sleep, Christ in the Midst of the People, The Fisherman* (from Goethe's ballad), *The Golden Age,* and *The Dispute Between Luther and Dr. Eck.* Hubner belonged to the great historic and religious school of German art.

HUC, *ük*, EVARISTE RÉGIS: distinguished French missionary-traveller: 1813, Aug. 1—1860, Mar. 31. He was educated in his native city, and about his 24th year he entered the missionary congregation of the Lazarist Fathers, and received holy orders at Paris, 1839. Almost immediately after his ordination, he joined the missionary expedition of his order to China. After about three years of missionary life in the n. districts of China, the new apostolic vicariate of Mongola was founded, and Huc, in company with a priest of the same congregation, Père Gabet, and a single native Chinese convert, undertook to explore the new district, and to ascertain its extent and its missionary capabilities. After a few months'

study of the Tartar dialects, they set out from the missionary station, n. of the Great Wall, called Si-wang, toward the close of 1844; and after a journey of excessive hardship over the high table-lands of Tartary, they took up their quarters for some months in one of the Lamaseries, or Tartar monasteries. Having here become familiarized in some degree with the Tibetan language, they succeeded in making their way, 1846, Jan., to H'lassa, cap. of Tibet, and residence of the Grand Lama; but scarcely had they settled in that city, when an order for their immediate expulsion from the country was obtained from the Lama by the Chinese resident in H'lassa. They were not permitted to choose their own route homeward, but having been put in charge of a Chinese escort, were carried back a journey of nearly 2,000 m. to the extreme south, and arrived 1846, Oct., at Macao, where they were subjected to a tedious trial by the Chinese tribunals. In the end, they were permitted to return to the missionary station of Si-wang, from which they had started. Huc's health having been completely broken down, he sailed from Macao 1849, Jan., and in the autumn of the same year reached his native city, Toulouse. In the following year he returned to Paris, where he published *Souvenirs d'un Voyage dans la Tartarie, le Thibet, et la Chine pendant les Années* 1844-46 (2 vols. Paris 1852). This was followed, 1854, by a similar record of his Chinese experience (*L'Empire Chinois*, 2 vols. 3d edit. 1857); and 1857 by an elaborate historical work on Christianity in China (*Le Christianisme en Chine*). All these have been translated into English and most other European languages. The strangeness of some of the incidents recorded in the book on Tibet provoked some incredulity in certain quarters; but Capt. Blakiston, a later traveller in the same regions, which had hitherto been almost a *terra incognita* for Europeans, bears unhesitating testimony to the fidelity of Père Huc's narrative and description, which still more recent travellers fully confirm. Huc's accounts however lack the value which would be given by precise scientific data. During his latter years, Père Huc, in order to devote himself more freely to his literary occupation, withdrew from the Lazarist congregation. His health never fully recovered from the fatigues of his Tibetan expedition, and he died in Paris at the early age of 46.

HUCKABACK, n. *hŭk'ă-băk* [Low Ger. *hukkebak*, pick-a-back]: perhaps originally meaning 'pedler's wares'; a rough coarse kind of linen used for common towelling, so woven as to be partly raised in figures like damask.

HUCKLE, n. *hŭk'l* [a dim. of prov. Eng. *huck*, a hook: Dut. *hucken*, to draw one's self together, to bend under a load; Ger. *höcker*, a hump, a knob: Icel. *hæcka*, to rise; *huka*, the hip]: a hump; a small joint; the hip; among *prov. miners*, the summit or apex of an anticline or sad-

dle-back. HUCKLE-BACKED, *-băkt*, having round shoulders. HUCKLEBERRY, the black whortleberry (see WHORTLEBERRY); Huckleberry is now the usual colloquial form. HUCKLE-BONE [Ger. *bein*, bone]: the hip-bone.

HUCKLEBERRY FINN, THE ADVENTURES OF: a story by Samuel L. Clemens (Mark Twain), published in 1884. It is a sequel to, and follows the fortunes of, the leading characters of the same author's *Tom Sawyer*. In this book the author not only preserves to us a valuable record of a rapidly disappearing social order, but throws light upon some questions of moment to the student of history.

HUCKSTER, n. *hŭk'stėr* [Ger. *höcker* and *höker*, a hump on the back, a petty retailer: Dut. *hoecker;* Dan. *hökre*, a chandler, a petty tradesman: O.Dut. *huycken*, to stoop down, to crouch: Icel. *húka*, to sit on one's hams: Low Ger. *huken*, to crouch]: a pedler, or one who carried his pack upon his back; a small retailer of provisions, etc.; a mean, trickish fellow: v. to deal in small articles or in petty bargains. HUCK'STERING, imp. HUCK'STERED, pp. *-stėrd*. Note.—HUCKSTER is really a fem. form corresponding to *hawker*, masc.

HUDDERSFIELD, *hŭd'ėrz-fēld:* parliamentary and municipal borough and important manufacturing and market town of England, in the West Riding of Yorkshire, in a fertile district, on an acclivity rising from the left bank of the Colne, 16 m. s.w. of Leeds, abt. 25 m. n.e. of Manchester. It is remarkably regular, is well built and drained, and very healthful. Upon the Holme and the Colne, which unite in the town, are numerous mills for woolen fabrics, and for fulling and washing the goods manufactured. Huddersfield is in a district rich in coal, and its natural advantages are enhanced by extensive and direct railway connections. A market hall in the Gothic style was opened here 1880. Among the churches, several are noteworthy in an architectural view. It has a proprietary college, now in connection with the London Univ.; a collegiate school, and many other educational institutions; a circular cloth-hall, 2,640 ft. in circumference, in which a market for woolen goods is held every Tuesday, and for general produce every Saturday; an infirmary; and in the vicinity the Lockwood Spa Baths, where the water is strongly sulphurous. Huddlesfield is the chief seat in n. England of what is called the 'fancy trade,' comprising shawls, waistcoatings, flushings, etc., of the most elegant patterns and finest fabrics; it has also extensive manufactures of narrow and broad woolen fabrics, kerseymeres, serges, and cords. It is connected by canals with the Mersey and the Humber. Pop. of parl. bor. (1901) 95,008.

HUDDLE, v. *hŭd'l* [Swab. *hudlen*, to do in an imperfect manner: Ger. *hudeln;* Dut. *hoeteln*, to bungle or botch: comp. Gael. *cadall*, a confused skirmish]: to

throng or crowd in a disorderly manner; to put on or up in haste or disorder; to crowd together in confusion: n. a crowd; confusion. HUDDLING, imp. *hŭd'lĭng*. HUDDLED, pp. *hŭd'ld*.

HUDIBRAS, *hū'dĭ-brăs*, SIR: the hero of a famous satirical poem by Samuel Butler (q.v.), published 1663-78.

HUDIBRASTIC, a. *hū'dĭ-brăs'tĭk:* similar to the style of the poem *Hudibras;* doggerel.

HUDSON: the largest river in the State of New York, has its head waters in Hamilton and Essex counties, and flows southwest into Saratoga County, then nearly directly east to Sandy Hill in Washington County, and from this point south through New York Bay into the Atlantic Ocean. It is fed by several of the Adirondack lakes, a number of small streams, and by Schroon River, Batten Kill, Hoosick, Wappingers and Croton from the east, and the Sacondaga, Mohawk, Wallkill, and Esopus Creek from the west. The Mohawk (q.v.), which flows into the Hudson at Cohoes, is the largest tributary; the Rondout enters the Wallkill near the Hudson. The head waters of the Hudson and the sources of several of the streams which flow into the Saint Lawrence are very near each other in the Adirondack Mountains. At Troy, three miles below the mouth of the Mohawk, the Hudson becomes a navigable tidal stream. There is a tidal rise of about one foot at Albany. Above Troy there are a number of rapids and long falls in the river; but below, the navigation is uninterrupted. At one time there were a few obstacles, the largest of which was Overslaugh, or Castleton Bar, at Castleton. This hindrance to navigation has been almost wholly removed by the Federal and State government. The Catskill Mountains, on the west side, begin about 25 miles below Albany. Lower down are the Highlands, averaging about 1,100 feet in height, which extend along the shore for a distance of about 20 miles. The Highlands of the Hudson are noted for their beautiful scenery. On the west bank are the famous Palisades (q.v.) about 13 miles long, their southern extremity being near Fort Lee, in New Jersey, and the northern extremity near Piermont, New York. This remarkable arrangement of rock rises from near the water's edge, almost perpendicularly, from 350 to 550 feet. Below Verplanck and Stony Point is an expansion in the river the upper part of which is called Haverstraw Bay and the lower part Tappan Sea. Many small islands in the river serve as foundations for lighthouses, or for the erection of dredging platforms. Iona, on which there is now a naval station, Constitution, and Beeren Islands have all figured in history. Below Albany the Hudson is more an estuary or fiord than a river, which accounts for the great depth of water. The area drained by the Hudson above where the Mohawk enters is about 30,000

square miles. The river is noted for its beautiful scenery from the source to the mouth. Along the lower part of its course there are many fine residences, as a large part of the country on both banks from New York to Albany is now a residential section. The Hudson is fittingly called the Rhine of America.

Hudson River was discovered by Verrazano, an Italian navigator, in 1524; but it was explored by Henry Hudson (q.v.) in 1609. The Indian name for the river was Shatemuc, and the first colonists called it North River, as the Delaware was then called South River. The part of the river west of New York city is still called North River; but it was given the name Hudson in honor of its first explorer. The history of the country since its discovery by Europeans occupies an important place in the history of the United States. The almost unbroken waterway from the Atlantic Ocean through what is now the State of New York, to the Saint Lawrence River, made this an important route for missionaries, traders, and for the armies in the various wars. From the mouth of Lake Champlain to Lake George, across the portage from Lake George to the Hudson, and the Hudson to the ocean was all disputed territory, and the scene of many a contest of the Revolutionary War. What a change in the map of America if Burgoyne had succeeded in his plan of 1777 to cut the nation in two by getting possession of Lake Champlain and the Hudson. See CHAMPLAIN, LAKE; CROWN POINT; HAVERSTRAW; TICONDEROGA.

The river is navigable for ships of the first class for about 117 miles from the ocean. Its whole length is about 300 miles. Before the introduction of railroads, the navigable waters of the Hudson, connecting New York with a large section of country, gave the city great opportunities for development. A canal built along the Mohawk Valley, in 1817-25, connected the Hudson with Lake Erie, and the Champlain Canal completed the water route from the Hudson to Lake Champlain. Later the Erie and the Delaware and Hudson railroads brought the coal of Pennsylvania to the Hudson River for transportation by water to markets in the interior. The New York Central and Hudson River Railroad is on the east side of the river and the West Shore on the west side. In 1807 Robert Fulton made on this river the first successful experiment with steam navigation. The Hudson is now a thoroughfare for an immense amount of freight, and elegant passenger steamers ply daily between New York and Albany. The government has erected and maintains 21 lighthouses and lighted beacons. Navigation ceases in winter because the river is frozen nearly its whole length. The ice crop harvested each winter on that part of the river between Albany and the Highlands is shipped, when navigation opens, chiefly to New York city. Shad fishing is one of the important Hudson

River industries. Many of the cities on the Hudson were at first only trading posts or ferry towns, but nearly all have kept pace in development with the rest of the State. The principal cities and towns on the river from north to south are Glens Falls, Sandy Hill, Fort Edward, Mechanicsville, Cohoes, Troy, Albany, Hudson, Catskill, Kingston, Poughkeepsie, Newburg, West Point, Peekskill, Haverstraw, Ossining, Nyack, Tarrytown, and Yonkers. At the mouth of the river are New York and Jersey City, with the suburbs, which are important shipping ports, Hoboken and Weehawken. The only bridge crossing the river between New York and Albany is the one which extends from Poughkeepsie on the east side to Highland on the west. There are 14 public ferries. The use of the water-power of the Hudson as an aid in developing electrical power for the mechanical arts is most important. From Mechanicsville the power of the Hudson is transmitted to the general electric shops of Schenectady. At Spiers Falls, at the foot of Mount McGregor, about forty miles above Albany, there has been constructed a dam,—a stone wall over 1,800 feet long, 100 feet high, and containing 1,800,000 cubic feet of masonry. The Hudson is raised 50 feet above its former river bed, then its waters fall 80 feet, and the power developed is (1904, 30,000 horse-power), transmitted for electrical machinery, to Schenectady, Albany, Troy, Amsterdam, and other places. The electric motors at Spiers Falls get some of their power from the older plant at Mechanicsville, about 20 miles distant. At other points storage plants will be constructed, more power will be developed, the current will be sent at a high pressure to sub-stations at Saratoga, Schenectady, Ballston, Glens Falls, Fort Edward, and Watervliet. This will mean running cars, lighting streets, driving machinery by power developed hundreds of miles away. This power development of the waters of the Hudson combined with development of like power of the waters of the Saint Lawrence at Massena (q.v.), keeps the two rivers, as in early years of our country, of vast importance to the State. Many industries are affected by this great new power, not the least of which are the coal-mining of Pennsylvania and the preservation of the Adirondack forests.

The Hudson occupies an important place in the historical, and mechanical development of the nation, also in its literary and artistic progress. Washington Irving, who lived at 'Sunny Side' and was laid to rest in Tarrytown, introduced to the world many of the places along the Hudson. Cro' Nest is associated with Joseph Rodman Drake and his poem, *Culprit Fay;* West Park and the country around have been practice observation ground for the naturalists John Burroughs and Ernest Ingersoll; Cornwall-on-the-Hudson was the home of N. P. Willis and E. P. Roe. Artists who have received inspiration from

Hudson's scenery and history have become sufficiently numerous and their works of importance enough to be called 'The Hudson School of Painters.' Consult Ingersoll, *Guide to the Hudson River;* Cooper, article in *Magazine of American History,* Vol. IV.

HUDSON or HUDSON'S BAY, Canada: an extensive bay or inland sea extending between lat. 51° and 64° n., and lon. 77° and 95° w. Its greatest length north to south is about 800 miles, greatest breadth, 600 miles. It is connected with the Atlantic Ocean by Hudson Strait and with the Arctic Ocean by Fox and other channels. Hudson Bay is navigable in summer from the middle of June to the end of October, being obstructed by drift-ice during the rest of the year. There are many islands, reefs and sand banks. The white whale is found in its waters, and there is a considerable summer fishery. Numerous rivers flow into the bay, the chief being the Nelson and Churchill on the east. The shores on the east are high and bold; those on the west are low and level, and much of the land is favorable for stock and dairy farming, while valuable deposits of iron ore, galena, and plumbago exist. With the exception of a few fur trading stations on the west and south coast, there are, however, no settlements.

HUDSON: town, Middlesex co., Mass., on the Assabet River, and on the Boston & M. and the Fitchburg railroads; about 17 miles northwest of Worcester. The town is situated in an agricultural region, but it is particularly noted for its manufactures, especially of articles made from leather and rubber. The chief manufactures from rubber are gossamer clothing, webbing, goring, and boots and shoes. Some of the other manufactures are paper and wooden boxes, leather, and leather boots and shoes. The town owns and operates the electric-light plant and the waterworks. Pop. (1910) 6,743.

HUDSON: city, port of entry, county-seat of Columbia co., N. Y.; on the Hudson River, and on the New York Central & H. R. and the Boston & A. railroads; about 30 miles south of Albany. Area of the city, one square mile. Hudson was settled in 1783 and was called Claverack Landing; but the year following the name was changed to Hudson. In 1785 it was chartered as a city, and in 1790 it was made a port of entry. From the first it was a trading station of importance and a whaling port. After the Revolution a large foreign trade was established, but the commerce of the city was injured by the destruction of its shipping in the war of 1812. The surrounding country is devoted largely to agriculture, and the city has a number of manufacturing establishments. The chief manufactures are foundry products, machinery, knit goods, car-wheels, and creamery products. It has a large sash and blind factory and several small manufacturing establishments. Some of its

prominent buildings are the State Volunteer Firemen's Home, the State House of Refuge for Women, an orphanage, hospital, and the city public buildings. The city owns and operates the waterworks. The government is vested in a mayor, who holds office two years, and a city council. Pop. (1900) 9,528.

HUDSON: town in Summit co., Ohio, on the Pennsylvania railroad, 20 miles south of Cleveland. This was one of the earliest settled towns on the Ohio Western Reserve, and prior to the civil war was an abolition stronghold. The Western Reserve College, before its removal to Cleveland, was located here. Pop. (1900) 2,240.

HUDSON: city, county-seat of Saint Croix co., Wis.; on Lake Saint Croix, an expansion of the Saint Croix River, and on the Chicago, St. P., M. & O. railroad; about 65 miles northwest of Eau Claire and 20 miles east of St. Paul, Minn. The chief manufactures are flour, finished lumber, furniture, railroad cars, machinery, beer, and brooms. The city has a large cold-storage plant and ample facilities for shipping butter, poultry, vegetables, and fruits. It has a large sanatorium. The electric-light plant and the waterworks are owned and operated by the city. Pop. 3,259.

HUDSON, HENRY: English navigator. The time and place of his birth appear to be lost. We only know that he had earned, perhaps by the time he was 40, sufficient reputation as a bold and skilful navigator to be placed in command of the ship *Half Moon* of Amsterdam. Early in 1609 he made a contract with a party of Dutch merchants to act as captain of their private exploring expedition, and in the written agreement between them he was described as 'Henry Hudson, Englishman.' This settles the honor of his birth country, though nothing more. At that time the one great commercial demand was for a shorter and better, all-sea trade route to the Far East. It was known that there was land to the west of Europe and it was believed that a passage could be found through these lands directly westward to the East. It is clear that Hudson believed that the western route was the most promising and, no doubt, he suggested it to his employers, but they evidently had more faith in a sea passage north and then east, round Europe and Asia to China. Thus it happened this English sea captain sailed from the Dutch port of Amsterdam in the small ship *Half Moon*, bound for China by the way of the North Cape. The ships' company of Dutch and English was fortunate in having as mate one Robert Juet (perhaps also of England), and the mate could read and write. Juet kept the ship's log, and in this log book on the first page are these words: 'On Saturday, the five and twentieth of March, 1609, after the old account (style), we set sayl from Amsterdam, and by the seven and twentieth day we were down at the Texel; and by twelve of the clock we were off the land, it being east of us two leages off.'

Once 'off the land' the ship was free to go where the captain pleased and it certainly did not please the crew to face the arctic cold of the attempted voyage round Europe. Solid pack ice and the open mutiny of the crew decided Hudson to turn back and he steered south—and west. It was evident that he felt free to carry out his own plans and reach China by another route. His owners' plans had failed and, while his plan might fail, his success would justify his action. Hudson's decision was almost as bold as that of Columbus for, while he had, no doubt, some knowledge of the lands to the west, he evidently had no conception of the shape or size of North America nor of the width of the Pacific.

The *Half Moon* was a slow sailer, and four months passed before she made the land along the eastern coast of what is now the United States. The log book described the land as 'low white sandy ground'—exactly describing all the shore line south of Sandy Hook. The book might also have described parts of Long Island or Cape Cod and it is clear it did not describe the coast of Maine, and it is more than probable the first land mentioned in the book was south of Sandy Hook for, on reaching the land and finding no passage westward, Hudson steered 'northeast by north' until, about two weeks later, he came to a great bay. The log book, which does not give the name of the month, and which must have been September, says, 'And from that lake or bay the land lyeth north by east, and we had a great streame out of the bay.' The *Half Moon* had found the 'great stream' described by Verrazano, and with the flood tide sailed into New York bay and headed for the Narrows and, as the log book says, 'came to three great rivers.' And it continues: 'So wee stood along to the northmost, thinking to have gone into it.' The *Half Moon* was off Manhattan. It was true Verrazano, in 1524, had entered New York bay and left a record of a high hill and a great bay out of which flowed a large river, but Verrazano had not the courage to pass the Narrows, except in a small boat. Other explorers may have looked into the bay. The *Half Moon* was the first ship to pass up the 'great stream' and to Hudson belonged the entire honor of discovering and exploring the river that now bears his name.

The pages of Juet's journal tell nothing of Hudson's own hopes, fears and anticipations. Yet, it is fair to think that Juet's enthusiasm over the beauty and value of the great valley was shared by his captain and that the ship's log was, in a sense, a reflex of Hudson's own views. There is no hint of Hudson's belief that he could reach China by this route, yet it is reasonable to suppose he entered New York bay in the hope that the 'great stream' would lead through the land to the Pacific. The great size of the bay and river and the fact that the tide flowed far into the land and that for the first few

days' sail the water remained salt, no doubt encouraged him to keep on through this most promising opening in the land. Favored by 'fairer weather' and a favorable breeze he steered northerly over the wide salt arm of the sea until the apparent strait became a river and the sea water became fresh. At the Highlands all hope of a road to China must have faded away. Still, he would sail on, push through the mountains and see what manner of country lay beyond.

The items of the log book plainly show that Hudson, after passing the Highlands, began to recognize the transcendant importance of his discovery. He had found a new land of surpassing beauty and fertility and everywhere clothed in splendid forests. Hudson clearly recognized the commercial value of his discovery, for the log book enumerates all the potential wealth of the river and valley in fish, game, lumber, fruits, vegetables, grains and peltry. It even mentions the fact that Hudson, while the ship was at anchor somewhere near the present city of Hudson, sent the ship's carpenter ashore to fashion a new forearm out of one of the primeval trees—the first bit of lumbering done by white men in the valley. Hudson seems to have decided, after reaching the upper river and sailing to a point opposite the Catskills, that the best way to mollify his owners on his return would be to report as fully as possible the potential wealth he had discovered and he sent a boat up the river to explore the country. The boat party appears to have been absent several days, for they rowed up stream about nine leagues or perhaps beyond Albany where, as the log book says, the boat found 'it bee at an end for shipping to goe in—with but seven foot water and unconstant soundings.' Meanwhile Hudson evidently traded with the Indians for peltry, no doubt regarding the furs as something that would demonstrate to his merchant owners the value of his discovery.

Three weeks after the *Half Moon* entered 'the great streame' she again passed Sandy Hook and steered away for Amsterdam. There is no record of the return voyage nor is there any record of Hudson's report to the merchants of Amsterdam, yet it is evident that his story and perhaps the exhibit of peltry created a tremendous sensation in the commercial cities of Holland. Hudson appears not to have cared much about this side of the affair. He seems to have considered his voyage a failure. He had tried to reach China and failed, and wished to sail again, but the merchants seem to have been wholly occupied in fitting out new ships under more commercial captains and would not listen to him. At last, after some delay, he did secure a second ship and set forth once more to find a sea path through America. He appears to have thought there might be a passage round by the north of America and he started for Baffin's bay. Once more he found a great passage leading westward into the

land, once more a salt water strait seemed to promise success, but it only led to an inland sea. His miserable crew, ignorant, frightened at the arctic cold and gathering ice, rose in mutiny, and putting their great captain in an open boat, with his son, a boy of seven, and some invalid sailors, set them adrift in the vast waters of Hudson bay and left them there to perish.

HUDSON, WILLIAM HENRY, American educator and critic: b. London, England, 1863, May 2. He was five years private secretary to Herbert Spencer (q.v.) and coming to America was assistant librarian of Cornell University 1890-2. He has been an assistant professor of English literature at Leland Stanford University from 1892, and has published *The Church and the Stage* (1886); *An Introduction to the Philosophy of Herbert Spencer* (1893); *Studies in Interpretation* (1896); *Idle Hours in a Library* (1897); *The Study of English Literature* (1898); *The Sphinx and Other Poems* (1900); *The Meaning and Value of Poetry* (1901); *Life of Sir Walter Scott* (1901); *Famous Missions of California* (1901); etc.

HUDSON'S BAY COMPANY, incorporated 1670, the great fur-trading and later landholding and administrative company of Northwest Canada. It originated in the dissatisfaction of two French Protestant employees of the French fur-trading monopoly at Quebec, Groseilliers and Radisson, with its unwillingness to extend the trade to Hudson bay, after vainly trying to induce Boston merchants and the French court to take up their scheme for so doing. They gained the ear of a company of London merchants and Prince Rupert, cousin of Charles II., brought a load of furs from the bay, and on May 2, 1670, Rupert and 17 associates received from Charles a charter for 'The Governor and Company of Merchants-Adventurers trading into Hudson's Bay.' It had the monopoly of the right to trade in the bay or on its coasts, and could expel any one entering the territory without its license; could build forts, send out ships of war and privateers, and declare war and make peace with any non-Christian people. Its capital was £10,500, divided into 34 shares with an extra one for Prince Rupert, and in 1676 it imported some £19,000 worth of furs, sending in return £650 worth of goods to the Indians. The profit was high on the petty capital paid in, but the gross amount was not large for a century. In 1748 the trade was carried on with four ships, and employed about 120 men in all, including the garrisons at its forts. The furs and other imports amounted to over £30,000, the exported goods to £5,000, and the costs of business over £17,000. The average profit was 40 per cent. on capital, but the sum was trivial. Moreover, the company had great losses and tribulations from the French rivalry and assaults, especially in the national wars. The French laid claim to the territory on the strength of a mythical expedition of

Jean Bourdon in 1656, and in 1682 and 1686 captured several of the company's forts, the two countries' trading posts shared in the long war ended by the Peace of Ryswick in 1697, captured each others' forts, and the peace yielded Port Nelson to the French, to the great damage of the company. The war of the Spanish succession inflicted frightful hardships on both sides: the company claimed a loss of over £100,000, hundreds of trappers and employees starved to death, and the Indians turned cannibals. The Treaty of Utrecht in 1713 finally resigned all French claim to the Hudson's Bay territory, and thence till the cession of French Canada, in 1763, the monopoly gave the company an easy life and good profits, though still on a small scale. But when that cession opened up access to Hudson's Bay from both land and sea, the possibilities of trade were incalculably enlarged. Despite the clandestine rivalry of Montreal traders who intercepted their boats, the gross volume increased manifold, and it was not crippled by the ravages of France in 1782, as part of the war begun in 1778, when they captured and partly ruined the massive stone Fort Prince of Wales at the mouth of Churchill river, and altogether destroyed property valued by the company at half a million pounds. But a much worse rivalry was at hand, organized and powerful: the Northwest Company started on a co-operative plan in 1784 by an association of Scotch merchants in Montreal. The Declaration of Rights having guaranteed free and open trade to all British subjects, this company invaded its rival's territory, and the trade competition for many years merged into actual war. In 1821 they had done each other so much harm that they consolidated, and parliament in view of the evils of competition empowered the crown to issue licenses for the 'Indian territories,' which was exercised in favor of the new company. Meantime exploration had been steadily enlarging the territory: Samuel Hearne for the old company had reached the Arctic in 1771, Alexander Mackenzie for the new one reached the Pacific in 1793. With the United States, its rivalry for the far Northwest was strenuous and persistent: it planted posts in the Oregon district, repelled settlers, and there was much danger of war till the boundary settlement of 1846 quieted the dispute. In 1849 it secured a grant of Vancouver Island. This was the time of its palmiest growth. In 1846 it had 513 employees and 35 offices, in 1856 it had over 3,000 employees and officers together, with 152 posts. Its trade monopoly expired by limitation in 1859, but there was also a great desire to settle the Northwest Territories, with which the fur-trade and administrative rights of the company were incompatible. The company, liable to be dispossessed by force if it refused to come to terms, agreed in 1869 to transfer its territorial rights to the Dominion of Canada for £300,000 and one-twentieth of the lands set out for set-

tlement by the government for the next 50 years. It retained its posts and its rights of trade. The transfer to Canada, and the survey of lands for settlement, was immediately followed by the Riel rebellion (q.v.). The company, despite its lapse of administrative powers, remains the most potent influence for law and order in the unsettled parts, through its relations with the Indians. Consult Bryce, *History of the Hudson's Bay Company* (1900); Willson, *The Great Company* (1900); Cawston and Keane, *Early Chartered Companies* (1896). For the Northwest Company, see also Irving, *Astoria.*

HUD'SON'S STRAIT. See HUDSON'S BAY.

HUE, n. *hū* [AS. *heaw,* form, appearance—from *heawan,* to show: Goth. *hiwi,* show, appearance: Sw. *hy,* complexion]: color, or shade of color; a compound color in which one of the primaries predominates; tint or dye. HUED, a. *hūd,* colored; having a color. HUE'LESS, a. *-lĕs,* without color.

HUE, n. *hū* [F. *huer,* to hoot, to shout: Bret. *huda,* to cry to frighten wolves: W. *hwa,* halloo: O. Sw. *huta,* to hoot]: a clamor; an outcry. HUE AND CRY, the legal pursuit of a thief or other offender by sending a description of him to police-offices, etc.; anciently, the pursuit of a felon, with horns, and loud outcries or clamor to give alarm. Whoever arrested the person pursued was so far protected that he required no warrant to justify the arrest, and even if the party turned out to be no felon, no action could be brought if the arrest was *bonâ fide.* But it was not only a ground of action, but an offense subject to fine and imprisonment, to raise the hue and cry against a person maliciously and wantonly. It was the duty of all persons to join in a hue and cry. Hue and cry in this sense is abolished.

HUÉ, *hwā* or *hô-ā',* or HUE-FOO, or QUANG-DUK, or PHU-THUA-THIEN, or SAN HUÉ: capital of Anam, on the Gulf of Tonquin, in the prefecture of Thua Thuan; 16° 30′ n. lat., 107° 12′ e. long., 10 m. from the mouth of the Hué river. It is built almost in the European style. Under the reign of King Cia-lung (1801-20), it was strongly fortified by French officers, and by treaty Anam and Tonquin came under French protection 1885. It is accessible only to vessels of the smallest class, owing to the shallowness of the small river on which it is situated. Pop. including suburbs within a radius of 2½ m., nearly 60,000.

HUELVA, *wĕl'vâ:* maritime town in s. Spain, cap. of the province of Huelva, which was formed out of a portion of the ancient kingdom of Seville (q.v.); at the confluence of the Odiel and the Tinto, 63 m. w.s.w. of Seville, with which it is connected by railway. Its trade with Portugal and Cadiz is considerable, and it carries on an extensive tunny-fishery; but its chief commercial importance is from the copper mines. The province of

Huelva is a mountainous region bordering Portugal and ocean; 4,197 sq. m. Pop. (1900) 260,880.

HUERTA, *wĕr'tâ*, VICENTE GARCIA DE LA: Spanish poet and critic: 1729-1797, Mar. 12; b. Zafra, Estremadura. He spent the greater part of his life in Madrid, where he held the office of principal librarian of the Royal Library, and where he died. His tragedy of *Raquel*, founded on the story of the love of King Alfonso VIII. for the fair Jewess Rachel, and its tragical catastrophe, was received with great enthusiasm 1778, and is still esteemed one of the best of modern Spanish tragedies. Huerta was a most zealous but not always a wise or skilful defender of the ancient Spanish national taste against the Gallicism which then prevailed. As a lyric and dramatic poet, he shows great command of language and versification. His poems were published in two vols. (*Obras Poeticas*, Madrid 1778-9). Huerta edited the *Teatro Español* (17 vols., Madrid 1785-6), a collection of the best works of the older Spanish dramatists.

HUESCA, *wĕs'kâ* (*Osca* of the Romans): very old and picturesque town of Spain, cap. of the modern province of Huesca (see ARAGON). It is surrounded by old walls once surmounted by 99 towers, only two of which remain, and is in a plain covered with vineyards, on the right bank of the Isuela, 50 m. n.e. of Saragossa. Among its chief buildings are the cathedral, built 1400, a beautiful edifice; the univ., founded 1354 by Pedro IV.; and the picturesque college of Santiago. It was once famous as a seat of learning. Tanning and manufactures of linens are carried on to some extent. Pop. 10,068.

HUESCAR, *wĕs'kàr:* small town of Spain, province of Almeria, 75 m. n.e. of Granada. The people are employed chiefly in manufacture of linen and woolen goods. Pop. reported abt. 6,000.

HUET, *ü-ā'*, PETER DANIEL: bishop of Avranches; last of the great French encyclopedists: 1630, Feb. 8—1721; b. Caen. His father had been converted from Calvinism, but died while Huet was still very young. Huet, who was brought up by his aunt, was educated in the Jesuit school of Caen, and made extraordinary progress in almost every department of learning. He was a zealous pupil of Descartes and of Bochart—the latter of whom he accompanied on his visit to Stockholm 1652, when he discovered and transcribed the MS. of Origen, the basis of his celebrated edition of that father. On his return to Caen, he gave himself up entirely to study; and as a preliminary to his translation of the text of Origen, he published, 1664, his well-known essay *De Interpretatione;* but it was only at the end of 15 years' study that he published his edition of Origen's *Commentaria in Sac. Scripturam*, 2 vols., fol. (Rouen 1668), with a most learned introduction, entitled *Origeniana*, since reprinted in the great Benedictine edition of that father. In 1670, Huet received

the degree of doctor of law; and soon afterward was summoned to Paris, to take part, with Bossuet, in the education of the dauphin. In 1679, he published *Demonstratio Evangelica.* In 1676, he entered into holy orders; and 1678, was named abbot of the Cistercian abbey of Aunay, from which place is named his well-known work, *Quæstiones Alnetanæ de Concordia Rationis et Fidei* (1690). About the same time he published a work *On the Site of the Terrestrial Paradise,* another *On the Voyages of Solomon,* followed later by *History of the Commerce and Navigation of the Ancients.* In 1685, he was named Bishop of Soissons, a dignity, however, on which he never entered, being transferred to the see of Avranches 1692. He was as zealous in the discharge of his episcopal duties as he had been in his devotion to literature; but his health having given way, he obtained permission to resign his see 1699, and retired to the abbey of Fontenay, near Caen; but 1701, he took up his residence in the Jesuits' house in Paris, and published, 1718, his autobiographical memoirs—a model of pure Latinity as well as an interesting record of the history of his time. His works were published 1712, and a volume of *Huetiana* appeared 1722.

HUFELAND, *hô'fĕh-lânt,* CHRISTOPH WILHELM: 1762, Aug. 12—1836, Aug. 25: b. Langensalza, in Thuringia: one of the most distinguished physicians of modern times. After having completed a general and medical education at the best schools in Germany, he was appointed physician in ordinary at the court of Weimar, where his father and his grandfather had previously filled the same office. Retaining this honorary title, he removed 1793 to Jena, to be ordinary prof. of medicine there; and he went from Jena to Berlin 1798 with a number of very honorable professional appointments. On the foundation of the Univ. of Berlin, 1809, he became one of its professors. He had a very high reputation for skill and tenderness as a physician, and he was held in high esteem for his character. His published works are numerous, chiefly on medical and physiological subjects. His *Makrobiotik,* or Art of Prolonging Life, originally published 1796, was translated into almost all the languages of Europe. Translations exist in Servian, Hungarian, and Hebrew. His most elaborate work is the *System of Practical Medicine,* 1837.

HUFF, n. *hŭf* [imitative of the sound of puffing up or swelling with wind, as a person in a fit of passion: Ger. *hauchen,* to breathe or blow: Pol. *chuch,* I huff you—from *chuchac,* to blow]: a puff up; sudden offense taken; a swell of sudden anger; a boaster: V. to blow or puff up; to offend; to swell or enlarge; to bluster; to blow, or remove a man from the board, as at draughts. HUFF'ING, imp. HUFFED, pp. *hŭft,* angry; offended. HUFF'Y, a. *-ĭ,* petulant; being in ill-humor. HUFF'INESS, n. *-ĭ-nĕs.* state of being puffed up; petulance. HUFF'ISH, a. somewhat huffy; petulant; arrogant. HUFF'ISHLY, ad. *-lĭ.* TO HUFF

UP, to puff up; to swell with wind. To TAKE HUFF, to take offense. To GIVE ONE A HUFF, to speak like an angry man to one.

HUG, n. *hŭg* [Dut. *huggeren;* Low Ger. *huddern,* to chill, to shiver—from the int. *ugh!* expressing a shudder of cold—cold affecting the frame so as to make a person crouch together, and bring his arms and elbows to press on his sides and breast: O. Dut. *huycken;* Ger. *höcken,* to crouch or squat]: a close embrace; a particular grip in wrestling: V. to embrace closely; to grip in wrestling; to keep close to, as to the wind, or the shore, in sailing: see CLOSE-HAULED, under CLOSE. HUG'GING, imp. HUGGED, pp. *hŭgd.* To HUG ONE'S SELF, to applaud or congratulate one's self on some supposed advantage or superiority.

HUG, *hûg,* JOHANN LEONARD: 1765, June 1—1846, Mar. 11; b. Constance. Hug studied at Freiburg, and 1789 entered priest's orders. In 1791, he was appointed prof. of Oriental languages, and of the Old Testament, to which was added, 1792, the professorship of the New Testament. These positions Hug held more than half a century, with the exception of brief occasional visits to the great libraries of Munich, Vienna, Paris, Milan, Rome, and Naples. The most important fruit of his biblical researches was his *Introduction to the New Testament* (2 vols. 1808), translated into most of the European languages. His works, in Latin and German, are chiefly in the department of biblical criticism, as *On the Age of the Vatican MS.* (1810), *On the Canticle of Canticles* (1813, and again 1818), *On the Indissolubility of Marriage* (1816), *On the Alexandrian Version* (1818), *Re-examination of Strauss's Life of Jesus* (2 vols. 1835).

HUGE, a. *hūj* [Icel. *ugga,* to fear: Scot. *ug;* O.E. *houge,* to feel horror at: Bret. *heug,* aversion (see UGLY)]: very large or great; enormous—applied to *bulk,* not to *space* or *distance;* immense. HUGE'LY, ad. *-lĭ,* enormously; very great; very much. HUGE'NESS, n. enormous bulk or largeness. *Note.*—Skeat derives this word from O.F. *ahuge,* huge, vast.—SYN. of 'huge': vast; prodigious; gigantic; colossal; immense; monstrous.

HÜGEL, *hü'gĕl,* KARL ALEXANDER ANSELM, Baron: 1796, April 25—1870, June 2; b. Ratisbon, Germany: diplomat and scientist. He studied law at Heidelberg Univ. 1811, served in the Austrian army as an officer 1813-14, was a member of the embassy appointed to secure the resignation of King Christian of Norway, went to Naples on a diplomatic mission 1821, retired to Vienna to apply himself wholly to scientific study 1824, travelled through Greece, Asia Minor, Egypt, Barbary, India, and Central Asia, and made exceedingly valuable collections in ethnography and natural science, coins, MSS., jewelry, and paintings 1831-37, and published *Botanisches Archiv* (Vienna 1837), *Kaschmir und das Reich der Sikhs,* 4 vols. (Stuttgart 1840-42), and *Das Becken von Kabul,* 2

vols. (Vienna 1851-2). His collections were purchased by the Austrian govt. for the Vienna Museum.

HUGER, *yô-jē*, ISAAC: 1742, Mar. 19—1797, Oct. 17; b. Limerick Plantation, S. C.: soldier. He was educated in Europe, served as lieut. in the Cherokee Indian war 1760, was appointed lieut.col. of the 1st S. C. regt. early in the revolutionary war, promoted col. of the 5th S. C. regt. 1776, brig.gen. U.S.A. 1779, Jan. 9; was wounded while leading his brigade at the battle of Stono 1779, June 20; led the Ga. and S. C. militia in the unsuccessful attack on Savannah, was defeated by Tarleton at Monk's Corner, S. C.; was again wounded at Guilford Court-House, and commanded the right wing of the army at Hobkirk's Hill. His nephew, FRANCIS KINLOCK HUGER (1764-1855, b. S. C.), studied medicine, and was an officer in the revolutionary war; and served in the war of 1812 with England. He was engaged in an attempt to release Marquis de Lafayette from his prison at Olmutz.

HUGGER-MUGGER, a. *hŭg'gėr-mŭg'gėr*, or HUDGE-MUDGE, a. *hŭj'-mŭj'*, and HODER-MODER, a. *hŏd'ėr-mŏd'ėr* [Ger. *mucken*, to mutter: Swiss, *muckeln*, to speak secretly of a thing: Norw. *mugg*, secrecy: Sw. *i mjugg*, clandestinely: Dan. *i smug*, secretly]: secret; clandestine; confused; disorderly; now generally applied to a mean or unsuitable way of living: V. to talk aside and in a low tone: AD. privately; clandestinely: N. aside talk in a low tone; confusion. -MUG'GERING, imp. -MUG'GERED, pp. *-gėrd*. See CURMUDGEON.

HUGGINS, *hŭg'ĭnz*, WILLIAM, D.C.L., LL.D.: astronomer; b. London, 1824, Feb. 7. He was educated at the London City School, studied privately mathematics, classics, and modern languages, educated himself in the physical sciences and astronomy, was elected a member of the Microscopical Soc. 1852, studied with the microscope animal and vegetable physiology, established a private astronomical observatory at his residence 1855, and since 1862 has given nearly all his attention to spectroscopic observations of the various heavenly bodies. He was elected a fellow of the Royal Soc. 1865. Since 1875 he has been engaged in obtaining photographs of the ultra-violet portions of the spectra of the stars. He was pres. of the Royal Astronomical Soc. 1876-78, pres. of the British Assoc. for the Adv. of Science 1891, and since 1900 has been pres. of the Royal Society. He has received a Royal medal, the Rumford and Copley medals from the Royal Soc., two medals from Royal Astronomical Soc., several prizes from the Académie de France and the Wilde, Draper, and Astr. Soc. Pacific medals. Besides many papers in transactions of scientific societies he has written (with Lady Huggins) *An Atlas of Representative Stellar Spectra* (1900).

HUGH CAPET, king of France, founder of the Capetian dynasty. See CAPETIAN DYNASTY.

HUGHES, *hūz*, BALL: American sculptor; b. London 1806, Jan. 19; d. Boston, Mass., 1868, March 5. He early exhibited a decided taste for modeling, and at 12 years of age made out of wax candle ends a bas-relief copy of a picture representing the wisdom of Solomon, which was afterward cast in silver. He was then placed in the studio of Edward Hodges Bailey, where he remained seven years. At this time he successfully competed for the prize awarded by the Royal Academy, winning the large silver medal for the best copy in bas-relief of the Apollo Belvidere; also the silver medal from the Society of Arts and Sciences for a copy of the Barberini faun, the large silver medal for the best original model from life, and a gold medal for an original composition, 'Pandora brought by Mercury to Epimetheus.' He emigrated in 1829 to New York, where his first work of importance was a marble statue of Hamilton, for the Merchants' Exchange, which was destroyed by fire in 1835. He subsequently removed to Boston, Mass. Among later works of his are the bronze statue of Bowditch at Mount Auburn Cemetery, a bust of Washington Irving, and a statuette of General Warren at Bunker Hill.

HUGHES, *hūz*, CHARLES EVANS, lawyer: b. 1862, April 11, at Glens Falls, N. Y. His early education was obtained in the public schools of Newark, N. J., and N. Y. city, but eventually attended Colgate and Brown Universities, graduating from the latter in 1881. In 1882 he taught in Delaware Academy, at Delhi, N. Y., after which he entered the Law School of Columbia University, and graduated 1885, winning a prize fellowship and an annual stipend of $500 for three years. He subsequently practiced law in New York city. From 1891-3 he was Professor of Law in Cornell University, afterward resuming practice in New York city. In 1905 he acted as counsel in the legislative inquiry into gas and electric lighting in New York city, and into the affairs of life insurance companies. In 1906 he was elected governor of New York.

HUGHES, DAVID EDWARD: English-American inventor; b. London 1831, May 16; d. there 1900, Jan. 22. When very young came with his parents to the United States. He was educated at Bardstown College, Kentucky, where he was appointed professor of music (1850), and later of natural philosophy. In 1855 he patented his first important invention, that of the well-known printing telegraph which bears his name. It was at once adopted in America, and by 1876 by practically every European country. In 1878 Hughes announced to the Royal Society his invention of the microphone, an ingenious instrument which not only transmits sound, but so magnifies faint sounds as to make them distinctly audible. The microphone is now in universal use in the telephone. Another important invention, that of the induction balance,

was completed by Hughes in 1879, and in 1880 he was elected a fellow of the Royal Society.

HUGHES, JOHN, D.D., American Roman Catholic prelate: b. 1797, June 24; d. New York 1864, Jan. 3. At 23 he entered the Roman Catholic theological seminary, Mount Saint Mary's, Emmittsburg, Md. He was ordained priest in 1826, and for a time was stationed at Bedford, Pa., from which he was transferred to Philadelphia. Here he had charge of Saint Joseph's parish and later Saint Mary's parish. In 1838 he was consecrated titular bishop of Basileopolis and appointed coadjutor to the bishop of New York. In 1842, after the death of Bishop Du Bois, he was made bishop of New York. In 1850 the diocese of New York became an archdiocese, and 1850, July 19, he was raised to the dignity of first archbishop of New York, which office he held until his death.

When a student at Mount Saint Mary's, he wrote the pamphlet, *An Answer to Nine Objections Against the Catholic Church.* When in Philadelphia, he wrote the replies to Dr. Breckenridge, a Presbyterian clergyman. The articles on both sides are issued in book form, *Hughes and Breckenridge.* He collected money for the rebuilding of Mount Saint Mary's after it had been burned. He established St. John's orphan asylum in Philadelphia, and a number of charitable institutions in New York. He settled decisively the 'trustee system' question which was agitating New York when he came there; and he defended the church property against the attacks of the 'Knownothing' element. The 'school question' was to him all important. One of his first undertakings was to establish a theological seminary at La Fargeville in Jefferson co., N. Y.; the distance from New York caused the abandonment of this plan, and Saint John's College (q.v.) was founded at Fordham instead. In 1858 he laid the corner stone of Saint Patrick's Cathedral. In 1861, during the Civil war, he was sent by the United States government to Europe, to present the cause of the Union, and counteract any adverse sentiment which might exist against the attitude of the North. His diplomatic mission was most successful in France, Italy, and Ireland. Consult Brann, *John Hughes,* in the *Makers of America Series;* Hassard, *Life of John Hughes.*

HUGHES, *hūz,* THOMAS: English author and politician; second son of John Hughes, of Donington Priory, Newbury, Berkshire: b. Uffington, 1823, Oct. 23; d. 1896, Mar. 22. He was educated at Rugby under the celebrated Dr. Arnold; entered Oriel College, Oxford, 1841, and took his degree B.A. 1845; was called to the bar at Lincoln's Inn 1848, and became a member of the Chancery Bar. In 1856, he gave to the world *Tom Brown's School-days*—a picture of life at a public school, evidently written from the author's own personal experience, and recording the vivid and enduring impressions that he brought with him from Rugby. This work attained great popularity in England and America, especi-

ally among the young. It was followed, 1858, by *The Scouring of the White Horse;* 1861, by *Tom Brown at Oxford,* in which the mental history of his hero is continued, with sketches of college life and incidents; and 1869, by *Alfred the Great.* H. pursued meanwhile the study and practice of the law. He gained the confidence of the working classes by endeavoring to promote a better understanding between masters and men, and by teaching the latter the value of co-operation as a means of social elevation. At the general election for Lambeth 1865, he was placed at the head of the poll. He was returned for Frome 1868, which he continued to represent till 1874, and always was prominent in debates relating to the combinations of trades-unions, and the law of master and servant. He was appointed queen's counsel 1869. In 1880, he assisted in founding on the Cumberland plateau in Tenn., a settlement or colony, of which he published an account under the title of *Rugby, Tennessee* (1881): see RUGBY (Tenn.). He wrote *Life of Daniel Macmillan* (1882).

HUGHES, THOMAS PATRICK, clergyman, author, orientalist, journalist: b. Ludlow, England, 26 Mar. 1838; educated at Ludlow School, Islington Coll: fellow on the foundation of the Punjab Orient University. Ordained clergyman in the Church of England 1864; asst. St. Silas Church, Islington, 1864; missionary and chaplain at Peshawar, Afghanistan, 1865–85; Government examiner in oriental languages 1875–85; entertained Ameer Sher Ali of Cabul 1868; interpreter for Sir Lewis Pelly at the Peshawar Political Conference 30 Jan. 1877. Chaplain at Peshawar during the Afghan War. Associate editor of *Civil and Military Gazette,* Lahore. Came to America May, 1885. Rector Lebanon Springs, N. Y., 1885; asst. All Soul's Church, N. Y., 1888; rector St. Sepulchre Church, N. Y., 1889. Asso. rector Church of the Epiphany, Brooklyn, 1902–3, On the staff of the *New York Churchman,* 1890; *Literary Digest,* 1896; *Commercial Advertiser,* 1897; contributor to the New York *Globe, Sun,* and various papers and magazines. Evening lecturer in the New York Public Schools. Author: *Notes on Mohammedanism; Poems of Abdur Rahman; Government Textbooks in Afghan Language; Dictionary of Islam; Ruhainah, the Maid of Herat,* and other stories and sketches under the nom de plum of Evan Stanton; *American Ancestry; Heroic Lives in Foreign Fields; The Future of Islam; The Stage from a Clergyman's Standpoint; The Biblical Play;* Oriental articles in encyclopedias.

HUGO, *hū'go*, F. *ü-go'*, VICTOR MARIE, Vicomte: foremost French author and one of the greatest poets of his time: 1802, Feb. 26—1885, May 22; b. Besançon, where his father was then commander of the garrison. (See *V. Hugo and His Times,* by Barbou, translated by Frewer 1882.). His mother was a native of La Vendée, and from her he imbibed romantic royalist sentiments,

though his father was a devoted follower of Napoleon. His youth was spent partly with his mother in Paris, partly in Italy and Spain, where his father held high appointments. He early acquired distinction by his poetic effusions; and before he was 30 years of age, his published works were numerous, and his name famous. Odes and ballads, romances, dramas, etc., flowed from his prolific pen. Shortly before the revolution of 1830, a literary revolution took place, at the head of which was Hugo. A band of young men, imaginative, ardent, and confident, sought to renovate French literature, by departing from classic rules and models, substituting a varied and very irregular verse for the monotonous Alexandrines of the old school, and making art precisely conform to nature, which they carried so far as even to bring into prominence things disagreeable, which nature herself is displeased with, and teaches us to keep out of sight. The new school, *la jeune France*, as they called themselves, formed the *Romanticists*, and their opponents were the *Classicists*. The literary war lasted several years. H.'s drama of *Marion Delorme* was received with enthusiasm; and he added to his reputation by the publication of *Feuilles d' Automne*. In 1832, the ministry suspended one of his dramas, *Le Roi s'amuse;* but his popularity continued to increase, and 1837 Louis Philippe made him an officer of the Legion of Honor, and 1845 a peer of France. After the revolution of 1848, he was elected to represent Paris, both in the constituent and in the legislative assembly, in which he manifested democratic principles, and was one of the members of the extreme left who were banished from France for life by Louis Napoleon. He went to reside in the island of Jersey. In 1852, he assailed the ruler of France in a political pamphlet, *Napoleon le Petit;* and next year, in *Les Châtiments*, a series of poems written with great *verve*, in the same spirit. In 1856, he published his *Contemplations*. He refused to avail himself of the amnesty of 1859, Aug. 15; but on the fall of the empire, hastened back to his native country, joined in the republican movement, and was returned to the national assembly at Bordeaux, which, however, he soon quitted in disgust. He then went to Brussels, but the Belgian government expelled him from the country, and he had to seek refuge in Vianden, a village of Luxemburg, where *L'Année Terrible* was composed. Returning to Paris 1871, July, he pleaded earnestly, but without effect, for the lives of the Communists. H. gave an account of his life in *Actes et Paroles* (1870–72). In 1862 appeared *Les Misérables;* *L'Homme qui Rit* (1869); *Quartrevingt-treize* (1874); his *Speeches* (1875); *Légende des Siècles* (1877); *L'Histoire d'un Crime* (1878); the didatic poems, *Le Pape* (1878), *Religions et Religion* (1880); *L'Ane* (1880); *Les Quatre Vents de l'Esprit* (1881). H. was a member of the French senate.

HUGUENOT, n. *hū'gĕ-nŏt* or *-nō* [possibly a corruption of *Eidgenossen*, the Swiss confederates—Geneva being the headquarters of Protestantism]: name applied to the Protestants of France in the 16th and 17th c. *Huguenot* has been discovered by Littré to have been a proper name in France at least two centuries before the Reformation, and may be nothing more than the Christian name of a conspicuous supporter of the sect in early times, applied in contempt, as usually is the case, to the whole sect. *Huguenot* may be a dim. of F. *Hugues*, Hugh.—This etymology may be more probable than the one first given, though the word appears to have originated in the usual popular corruption and accommodation. HU'GUENOTISM, n. *-ĭzm*, tenets of the Huguenots, *-nŏts* or *nōz*.—One of the most eminent names in the early history of French Protestantism is that of Farel (q.v.), and one of the first supporters of its cause was Margaret of Valois, queen of Navarre, and sister of Francis I. Subsequently, in the time of Calvin, many of the nobles and middle classes embraced the reformed religion. Francis I., however, opposed it with great severity, and caused many to be burned as heretics. The alliance of Henry II. with the German Protestants gave at first an impulse to the Reformation, but the aspect changed when the family of Guise obtained the ascendency at court. Under Francis II. a chamber (*chambre ardente*) was established in each parliament for the punishment of Protestants; and executions, confiscations, and banishments were common in all parts of the kingdom. The Protestants under these oppressions took up arms against the government, choosing Louis I., Prince of Bourbon-Condé, for their leader. 1560, Feb. 1, in a meeting at Nantes, they resolved to petition the king for freedom of religion, and for the removal of the Guises; and in the event of his refusal, to seize the king's person, and proclaim Condé gov.gen. of the kingdom. But the court, being apprised of the conspiracy, fled from Blois to Amboise, and the Duke of Guise was appointed gov.general. Some bands of Protestants, approaching Amboise with weapons in their hands, were easily defeated and taken; 1200 died by the hand of the executioner. The Edict of Romorantin, 1560, May, took the prosecution of heretics out of the hands of the parliament, and gave it into those of the bishops. By the Assembly of Notables in Aug., it was resolved that the whole matter of religion should rest until the next assembly of the states. While the Guises plotted the death of the Prot. leaders, Charles IX. ascended the throne, a prince not yet of age; and the queen-mother, Catharine de' Medici (q.v.), having removed the Guises from the helm of the state, was compelled to seek the support of the Protestants against them and their party. In 1561, July, appeared an edict which freed the H. from the penalty of death. For the complete termination of strife, the court opened a religious conference at Poissy Sep. 3. The chief disputants were the Cardinal of Lorraine on one side, and Theodore Beza on the other. The effect of the discussion was to unite and embolden the Protestants, with whom the machinations of the Guises forced Catharine into closer

alliance. 1562, Jan. 17, appeared an edict, giving noblemen the right of the free exercise of their religion on their own estates.

The Guises and their partisans became exasperated. 1562, Mar. 1, a company of Protestants met in a barn at Vassy for religious exercises, was attacked, and many of them were massacred by the followers of the Duke of Guise. On this, Condé hastened to Orleans, and called his co-religionists again to his standard; while the Guises took possession of the persons of the king and his mother, and proclaimed the Protestants rebels. 1562, Sep. 11, the royal troops, after much bloodshed, took Rouen, and Dec. 19 a battle was fought at Dreux, in which, after a hard struggle the Protestants were defeated. The Duke of Guise marched on Orleans, but was assassinated in his camp before that city, 1563, Feb. 18. Hereupon the queen mother hastened to conclude the peace of Amboise Mar. 19, by which the Protestants were allowed the free exercise of their religion, except in certain districts and towns. Catharine, however, hated the new faith, and formed a close alliance with the Spaniards for the extirpation of heresy, retrenched the new liberties of the Protestants, and made attempts upon the liberty and the life of Condé and of the Admiral Coligny (q.v.). These leaders of the Protestant party adopted the resolution of taking possession of the king's person. The court fled to Paris, which Condé invested; but 1567, Nov. 10, a battle was fought at St. Denis between Condé and a much superior force under the Constable Montmorency (q.v.), in consequence of which Condé fell back into Lorraine, where he effected a junction with an auxiliary force of 10,000 men from Germany, under Prince John Casimir. After this, he again threatened Paris; whereupon Catharine concluded peace at Longjumeau 1568, Mar. 27, reestablishing the terms of the treaty of Amboise. Nevertheless, she proceeded to persecute the Protestants, of whom 3,000 were assassinated or executed. The Protestants having, however, reeeived assistance in troops from Germany, and in money and artillery from England, began the third religious war. But 1569, Mar. 13, they were defeated, and Condé their leader slain, at Jarnac by the royal troops under the Duke of Anjou, afterward Henry III. These misfortunes greatly dispirited the Protestants. Jeanne d'Albret, queen of Navarre, endeavored to reanimate them in an assembly at Cognac, and set up her son, afterward Henry IV., as the head of the Prot. cause. Coligny became their military leader, and having received further assistance of troops from Germany, he laid siege to Poitiers, but was again defeated by the Duke of Anjou at Moncontour, Oct. 3. Fresh reinforcements from England, Switzerland, and Germany, enabled Coligny to take Nîmes 1569, and to relieve Rochelle, while Lanoue obtained a victory over the royal troops at Luçon. Catharine and her son now sought for peace, to which the Protestants, weary of the hard contest, consented. The treaty, concluded at St. Germain-en-Laye 1570, Aug. 8, gave to the Protestants an amnesty, the free exercise of their religion everywhere, except

in Paris, and the possession of a number of places of security.

Catharine, having failed to overthrow the Protestant cause in the open field, sought to accomplish her object by treachery, and by a general massacre of Protestants on St. Bartholomew's Day (q.v.) 1572. Although deprived of their leaders, and weakened by the slaughter of great numbers of their best and bravest, the Protestants flew to arms. The Duke of Anjou, after having lost his army before Rochelle, took advantage of his election to the throne of Poland, and 1573, June 24, concluded a peace by which the Protestants obtained the free exercise of their religion in their places of security, Montauban, Nîmes, and Rochelle, and a certain concession of liberty of conscience. A section of the Rom. Cath. nobility, at whose head was the Duke of Alençon, youngest son of Catharine, from purely political motives, united with the Protestants in opposition to the government of the queen-mother and the Guises. Catharine, therefore, incited her third son, Henry III., who had now succeeded to the throne, immediately to recommence hostilities against the Protestants. But, contrary to all expectation, the Protestant cause was highly prosperous during 1575. A peace was concluded at Beaulieu May 8, by which the Protestants were freed from all restrictions in the exercise of their religion, and obtained a number of places of security. The king also paid their German auxillaries. The Duke of Guise, thus frustrated in his political designs, originated a Rom. Cath. association, called the Holy League, at the head of which the king put himself in the Assembly of the States at Blois, 1576, Nov. 6; and then the sixth religious war began. Peace was, however, again concluded by the king himself at Bergerac, 1577, Sep., on the former conditions; and Catharine, to diminish the power of the Duke of Guise, entered into a private treaty with Henry of Navarre at Nerac, by which several places of security were made over to the Protestants. The terms of peace being violated by the court, Henry I., Prince of Condé, son of Louis I., and, like his father, a leader of the Prot. party, commenced the seventh religious war (called the *guerre des amoureux*) 1579, Nov., by the occupation of Lafère, and Henry of Navarre, 1580, April, took Cahors. But Condé, having been driven out of Lafère by Matignon, and Henry of Navarre vanquished at Mont-Crabel by Biron, peace was concluded at Fleix, 1580, Nov.

There was now a comparatively long interval of repose till 1584, when, by the death of the Duke of Anjou (formerly of Alençon), Henry of Navarre became heir to the throne of France. Hereupon Henry, Duke of Guise, exerted himself for the revival of the League, entered into an alliance with Spain and the Pope for the extirpation of heresy, declared the Cardinal of Bourbon heir to the throne, and began hostilities against the Protestants. This war is commonly known as the 'war of the three Henries.' The king soon made terms with him, and declared all the privileges of the Protestants forfeited. The Protestants, having obtained troops from Germany and money

from England, entered on the eighth religious war, which was prosecuted with various success, Henry of Navarre commanding the Prot. army. The Duke of Guise, in the midst of these troubles, grasped the whole power of the state. But his designs with regard to the throne having become very evident, the king caused him and his brother the cardinal to be assassinated at the Assembly of the States at Blois, 1588, Sep. In less than a year, the king was himself assassinated by a monk named Jacques Clement, and Henry of Navarre succeeded to the throne, and signed the famous EDICT OF NANTES (see NANTES), 1598, Apr. 13, by which the rights of the Protestants were established and enlarged. About 1590, the H. exercised their worship in abt. 3,500 chateaux, and in abt. 200 towns or bourgs, mostly in the south and west of France.

Under the reign of Henry IV., whose great minister, Sully, was himself a Protestant, the Protestants lived in tranquillity. But when, during the minority of Louis XIII., Mary de' Medici, the queen of Henry IV., assumed the reins of government, the independence which the Protestants enjoyed stood too plainly in the way of a court bent upon absolutism. The king, indeed, took an oath, 1614, to maintain the Edict of Nantes, but the marriage treaties with the Spanish court excited the apprehensions of the Protestants to such a degree that, 1615, Nov., they made common cause with the Prince of Condé, who had then set up the standard of rebellion. This they did contrary to the advice of the most sagacious of their own party. Although by the treaty of Loudun, 1616, May 4, they obtained a new confirmation of their freedom of worship, the court now waited only for an opportunity of breaking at least their political power. In 1617, June, a royal edict commanded the entire suppression at once of the Prot. Church, and of political privileges, in the province of Beárn; but the provincial court at Pau refused to register the edict, and the matter lay over till 1620, when, at the instigation of the Jesuits, and of his favorite, De Luynes, the king carried the edict into full effect by force of arms. The Protestants throughout all France took alarm, and hostilities again broke out, 1621, May. At the head of the Protestants were the two brothers, the Duke of Rohan and the Prince Soubise. Their cause, however, was feebly maintained; almost all the Protestant towns fell into the hands of the king, force, stratagem, and bribery being equally employed. At last, after the capitulation of Montpellier, 1622, Oct. 21, there followed a general peace, by which the Edict of Nantes was confirmed, but the right of prohibiting the assemblies of the Protestants was assumed on the part of the crown. The court, however, paid little attention to the stipulations of the treaty, and when the government was involved in difficulties in Italy, the Protestants took the opportunity again to rise in arms. Soubise, with a fleet furnished by the town of Rochelle, oftener than once defeated the weak royal navy. Cardinal Richelieu (q.v.), who was now at the helm of affairs, found himself under the necessity of

making offers of pacification, which were rejected. Hereupon the cardinal resolved on the capture of Rochelle, the most important stronghold of the Protestants. This he accomplished after a heroic resistance by the inhabitants, 1627–8. The fall of Rochelle was speedily followed by that of Nîmes, Montauban, Castres, and all the other Protestant strongholds. Now left defenseless, the Protestants were entirely dependent on the will of the court, which, however, made no attempt to deprive them of their liberty of conscience. At the accession of Louis XIII. they had abt. 500 churches; which had increased in 1628 to 688, and in 1637 to 720. It was Louis XIV., when he became superstitious in his old age, who, at the instigation of Madame de Maintenon and his confessor Lachaise, commenced anew the persecution of the Protestants. He gradually deprived them of their equal civil rights, and endeavored to put down the Prot. Church altogether. Bodies of troops, accompanied by monks, passed through the southern provinces, compelling the inhabitants to renounce their religion, demolishing the places of worship, and putting to death the preachers. Hundreds of thousands of Protestants fled to Switzerland, the Netherlands, England, and Germany. In vain was it attempted to restrain this self-expatriation by cordons along the borders. Many Protestants also made an insincere profession of Rom. Catholicism. These, on the slightest appearance of relapse, were put to death. Between 1657 and 85, 520 churches (according to Anquetil 700) were destroyed. At last, 1685, Oct. 23, Louis revoked the Edict of Nantes. (See Rulhière, *Eclaircissements Historiques sur les Causes de la Révocation de l'édit de Nantes*, 2 vols. Paris, 1788.) Hereupon began a new flight, followed by a still more fearful persecution of the Protestants. Their marriages were declared null; their children deprived of the right of inheritance, and forcibly shut up in convents; their preachers indiscriminately put to death. From the vicinity of Nîmes, where they had always been very numerous, thousands betook themselves to the mountains of the Cevennes, and continued the exercise of their religion in secret. Among these and the mountaineers of the Cevennes, a remarkable fanatical enthusiasm displayed itself, and, under the name of Camisards, they maintained for a number of years a wonderfully successful opposition to the forces of the great monarchy. The *War of the Cevennes*, or *Camisard War* (see CEVENNES: CAMISARDS), was not terminated until 1706, the suppression of the local rebellion being attended with circumstances of great cruelty. France had lost by this time more than a million of her most active, enterprising, and industrious citizens; and, notwithstanding all the persecutions, about two millions continued to adhere to the Prot. religion.

The partial repose which the Protestants enjoyed for more than ten years was attended by a revival of their worship, especially in Provence and Dauphiné. In 1724, therefore, Louis XV., at the instigation of the Jesuits, issued a severe edict against them. The spirit of the age, however, now

began to be opposed to persecution. An edict of 1752 declared marriages and baptisms by Prot. ministers to be null, and required the repetition of them by the Rom. Cath. clergy. But when, upon this, many began again to flee from their country, the disgust of the Rom. Catholics themselves was so much excited, that the court recalled the edict. Montesquieu successfully advocated the cause of toleration; Voltaire did much to promote it by his exposure of the judicial murder of John Calas (q.v.). At last by an edict 1787, which indeed was not registered by the parliament till 1789, Louis XVI. declared the Prot. marriages and baptisms valid, and restored to the Protestants equal civil rights, except that they might not be advanced to public offices and dignities. Even in 1789, a proposal for the complete emancipation of the Protestants was rejected by the national assembly, which, however, admitted Protestants, and even Prot. preachers as members without objection; and in 1790, it passed a decree for the restitution of all the properties of those not conforming to the Rom. Cath. Church which had been confiscated since the time of Louis XIV. The *Code Napoleon* gave Protestants in France equal civil and political rights with Rom. Catholics. The charter granted by the Bourbons acknowledged the freedom of Prot. worship, and the state pledged itself for the maintenance of the pastors; yet, under the government of the Restoration, the privileges of Protestants were in many ways circumscribed. After the revolution of 1830, July, the Reformed Charter of France proclaimed universal freedom of conscience and of worship, which principle has been maintained in subsequent changes. Protestants are not now subjected to many exceptional hardships, and have in various important instances been protected by the imperial authority from the arbitrary exercise of power attempted by illiberal local magistrates adverse to their religion. But the *recognized* Prot. Church—in which are included both *Reformed* and *Lutherans*, and of which the pastors receive small salaries from the state (see FRANCE) —was not till 1872 permitted to hold synods or general assemblies; at a synod in that year the conservative party in the church, in spite of some opposition, carried their proposal that the church, which had long been without a formally binding creed, should adopt an evangelical confession. There were, a few years since, abt. 500,000 Calvinists in France, of which abt. one-fifth were in the north. In recent years there has been in Paris and several other large cities a great increase of Protestantism. (See MCALL MISSION.) See Félice, *Hist. des Protestants en France* (1851); Haag, *La France Protestante* (1859); Smiles, *The Huguenot in England* (1867); Baird's *Rise of the Huguenot* (1880); *Huguenot Emigration to America* (2 vols. 1885).

HUILE DE CADE, *ü-él déh kâd:* brownish, inflammable, oily liquid, obtained by the dry distillation of the

wood of *Juniperus oxycedrus.* It is used externally in veterinary medicine, also for the human subject. It is a good local remedy in toothache. It has been given internally in worms, but is dangerous and uncertain.

HULDA, *hŭl'dâ,* or HOLDA, *hōl'dâ* or *hŏl'dâ* ('the friendly, the benignant'), well known in old German legends and traditions as *Frau Holle:* originally a goddess of marriage and fecundity. Worshipped and invoked by maids and wives, to the former she sent bridegrooms, to the latter, children; great numbers of whom were believed to surround her in her favorite haunts in the depths of the sea, or the hearts of hills. She was also the patroness of agriculture and domestic life, with its manifold employments. Sometimes she was regarded as a celestial being, and anciently the people used to say when the snow fell: 'Hulda is making her bed.'

HULK, n. *hŭlk* [mid. L. *hulka,* a heavy merchant ship: F. *hourque,* a large fly-boat, a hulk: Norw. *holk,* a tub: Flem. *durk,* the place in a ship where the foul water collects]: a large ship of clumsy make; the body of a ship—generally said of an old ship unfit for service, and used in harbor as a depot of some sort; anything bulky or unwieldy, as a bulk of a fellow; in *mining,* an old excavated working. HULKY, a. *hŭlk'ĭ,* large; extra-sized. THE HULKS, old or dismasted ships, formerly used as prisons for convicts. A GREAT HULKING FELLOW, a large, overgrown, and lazy man.

HULL, n. *hŭl* [AS. *hulu,* a husk: Dut. *hullen,* to put a mask on: Dan. *hylle,* to wrap: Ger. *hülle,* a clothing, a veil]: the outer covering of anything, as of a nut or grain; in *Scot.,* the shell of a bean; or a pea-pod: V. to husk or shell; to take off the outer covering or husk. HULL'ING, imp. HULLED, pp. *hŭld.* HULL'Y, a. *-ĭ,* having husks or pods.

HULL, n. *hŭl* [Dut. *hol,* hollow: F. *houle,* the waves or rolling of the sea (see HOLD 2, and HULL 1)]: *literally,* the hollow husk or shell which floats; the body of a ship, exclusive of masts and rigging: V. to pierce the body of a ship with shot. HULL'ING, imp. HULLED, pp. *hŭld.* HULL DOWN, said of a ship when the masts and sails only are seen above the horizon.

HULL, *hŭl,* ISAAC: 1775, Mar. 9—1843, Feb. 13; b. Derby, Conn.: naval officer. He was nephew of Gen. William Hull, by whom he was adopted after his father's death. Declining a proffered course at Yale College, he went to sea when 14 years old, was master of a merchantman in the London trade when 19, and was appointed lieut. in the U. S. navy when 25. In 1801 he was assigned to the frigate *Constitution,* 1804 promoted master-commanding, and 1806 capt., and was on constant duty as capt. and commodore 37 years. During this period he distinguished himself in the Barbary expeditions, and the war of 1812 between the United States and

Great Britain. In the *Constitution* he escaped from a British squadron of 5 vessels in a three days' pursuit, July; and fought, captured, and burned the British frigate *Guerriere* Aug. 19. For the latter achievement congress voted him a gold medal and his officers and crew $50,000 as prize-money.

HULL, *hŭl,* or KINGSTON-ON-HULL, *kĭngz'ton-ŏn-hŭl:* important and flourishing English river-port, a parliamentary and municipal borough and county of itself; in the East Riding of Yorkshire, in a low, level plain on the n. bank of the Humber, at the confluence of the Hull with that river, 53 m. e.s.e. of York. Of the ecclesiastical edifices the most notable are the Church of the Holy Trinity, a beautiful and ornate Gothic structure, the transept of which is the oldest English brick building in the country; and St. Mary's Church, Lowgate, one-half of which was removed to make room for the mansion-house of Henry VIII., who occasionally resided here. There are important educational and charitable establishments.

The docks—the Old Dock, the Humber, the Junction, the Railway, and the Victoria docks—are very extensive, the last being the largest. It occupies part of the site of an old citadel with a battery of 21 guns, which, till 1864, commanded the entrance of Hull Roads and the Humber. A new dock which greatly increases the accommodation for shipping was opened 1869. Hull was one of the first ports in England to engage in the whale-fishery, which it has now almost abandoned; but its fisheries for edible fish employ nearly 700 boats. Hull is a principal steam-packet station, and ocean-steamers ply regularly to many principal ports of Belgium, the Netherlands, and Denmark. It is the great outlet for the woolen and cotton goods of the midland counties, with which it has direct communication, by railway, river, or canal. Many ship-building yards are in operation here, and the chief manufactures are those principally to which a flourishing port gives rise, as ropes, canvas, chain, chain-cables, machinery, etc. There are many mills of various kinds as well as chemical factories, tanneries, potteries, and sugar-refineries. Immense commercial intercourse subsists between Hull and the countries of n. Europe, the principal exports being woolen and cotton manufactured goods; and the imports timber, corn, wool, iron, flax, hemp, tallow, hides, pitch, bones, and horn. A grand total of 5,000,000 tons annually enters and clears the port, which ranks it as the fifth port of the United Kingdom. Hull returns 3 members to parliament. Pop. (1901) 240,618.

HULL: city, Ottawa co., Quebec, Canada; on an island in the Ottawa river, opposite the city of Ottawa, with which it is connected by a fine suspension-bridge; on the Canadian Pacific R. R. It has abundant and improved water-power. Mica, phosphate, and iron mines are profitably worked in the vicinity. Among the industries are

manufactories of axes, lumber, pails, matches, woodenware, and paper, and there are carding and woolen mills. Pop. (1901) 13,993.

HULL, WILLIAM: 1753, June 24—1825, Nov. 29; b. Derby, Conn.: soldier. He graduated at Yale College 1772; studied divinity and law; was admitted to the bar 1775; served through the revolutionary war with distinction, and received the thanks of congress; practiced law at Newton, Mass.; was maj.gen. of Mass. militia in Shay's insurrection; gov. of Mich. Terr. 1805-12; brig.gen. commanding the n.w. army 1812; surrendered Detroit to the British 1812, Aug. 16; court-martialed, declared guilty of cowardice, and sentenced to be shot 1814; pardoned by the pres.; and passed the rest of his life on his farm at Newton, Mass. His conduct at Detroit has been fully justified and the injustice of his treatment demonstrated.

HULLABALOO, n. *hŭl'lă-bă-lô'*, or HURLY-BURLY, n. *hėr'lĭ-bėr'lĭ* [F. *hurluberlu*, abruptly, with a clatter: Low Ger. *huller-de-buller*, signifying hasty in action: F. *hurler;* OF. *huller*, to howl, to yell]: words formed to represent a confused noise; the thick of battle; uproar; confusion. *Note.*—The F. *hurluberlu* was really derived from Eng. *hurly-burly;* and the Eng. *hullabaloo* is said to be a mere corruption of the French.

HULLAH, *hŭl'lah*, JOHN: English composer and teacher of music: 1812, June 27—1884, Feb. 21; b. Worcester. He studied at the Royal Acad. of Music, and was the composer of Charles Dickens's operetta, *The Village Coquette*, 1836, followed by two other comic operas. In 1841, he began his great system of popular singing classes. More than 25,000 pupils passed through these classes 1840-60. He became prof. of music at important London schools, and 1874, inspector of training schools for the United Kingdom. Hullah had little sympathy with recent developments of modern music, and opposed the 'Tonic Sol-fa' method; he was author and editor of many musical works, and published *History of Modern Music* (1862), and *The Third Period of Musical History* (1865).

HULSEAN LECTURES, ETC., *hŭls'ē-an:* institutes founded at Cambridge Univ., England, by the Rev. John Hulse, of Elworth, Cheshire (1708-89). He was educated at St. John's College, Cambridge; and bequeathed the bulk of his property to the university: the annual income from the endowment is £800 to £900. His will, containing 400 pages folio, with nine codicils, provides for founding two divinity scholarships in St. John's College, the Hulsean prize, the office of Christian Advocate (in 1860, changed into the Hulsean Professorship of Divinity), and that of Hulsean Lecturer or Christian Preacher. The first course of lectures was delivered 1820; the number was originally 20. The lecturer, appointed annually, must deliver four lectures before the university. Of the annual

income eight-tenths go to the professorships; the remainder is divided between the lectureships and the prize.

HUM, n. *hŭm* [Ger. *hummen;* Dut. *hommelen,* to hum or buzz as a bee—from direct imitation: L. *bombus;* Gr. *bombos,* a humming]: the noise of bees or other insects; a low confused noise; formerly an expression of applause. HUM, int. [Icel. *hvums,* the hissing of a suppressed utterance]: a sound implying doubt and hesitation: V. to utter sounds like bees; to sing without words in a low or undertone; to utter low sounds expressive of indignation; in *OE.,* to flatter; to cajole [Port. *zumbir,* to buzz; *zombar,* to joke]. HUM'MING, imp. HUMMED, pp. *hŭmd.* HUM'MER, n. *-mer,* one who hums; in *OE.,* an applauder. HUMBLE-BEE, which see. HUMS AND HAWS, a suppressed utterance with stammering, indicating that the person is at a loss what to say. HUMDRUM, n. what goes on in a humming, drumming, droning way: ADJ. monotonous; commonplace; stupid. HUMMING, n. *hŭm'mĭng,* the sound of bees. HUMMING-BIRD, see below.

HUMAN, a. *hū'măn* [L. *hūmānŭs,* human—from *hŏmō,* man: F. *humain*]: of or pertaining to mankind; having the qualities or nature of man. HU'MANLY, ad. *-lĭ,* after the manner of men. HUMANITY, n. *-măn'ĭ-tĭ* [F. *humanité*—from L. *hūman'ĭtas*]: the quality of being human; the peculiar nature of man; the human race; benevolence; tenderness; mental cultivation befitting man; in *Scot. Univ.,* one of the *humanities,* viz., Latin, Greek, rhetoric, poetry, and grammatical studies, the acquisition of which is supposed to humanize or polish the mind—now restricted to the Latin language (see HUMANISTS). HUMANE, a. *hū-mān',* kind; tender, and compassionate; having the feelings proper to man. HUMANE'LY, ad. *-lĭ.* HU'MANIZE, v. *-īz,* to soften; to render kind and tender; to make civilized. HU'MANIZ'ING, imp.: ADJ. investing with the character of civilized man; softening. HU'MANKIND, the race of man; the human species. HUMAN'ITA'RIAN, n. *-tā'rĭ-ăn* (see below).

HUMANISTS, *hū'man-ĭsts* [Lat. *literæ humaniores,* polite letters—whence the title *Humanity* for the professorship of Latin in Scottish universities]: name assumed in the beginning of the 16th c. by the party who cultivated classical literature especially, as the most valuable instrument of education, in opposition to those who clung to the ancient methods of the *Scholastics* (q.v.). Later, the name became a word of reproach for those who, in the 18th c., showed a blind zeal for the classics as the sole educational subject; opposing the Philanthropists (see PHILANTHROPY), who asserted the value of mathematics, science, modern languages, and history. The name is often given to the foremost scholars from the time of the Renaissance onward, such as Hutten (q.v.), etc.

HUMANITARIANS, *hū-măn-ĭ-tā'rĭ-ans:* designation of anti-Trinitarians, who regard Christ as a mere man,

and refuse to ascribe to him any supernatural character, whether of origin or of nature. The earliest assertors of the purely Humanitarian theory are Theodotus of Byzantium, and Artemon, in the 2d c. (see UNITARIAN). The name Humanitarians is sometimes applied also to the disciples of St. Simon, and in general to those who look to the perfectibility of human nature as their great moral and social dogma; also to those who, from over-philanthropy, object to severe legal measures, such as capital punishment, etc. For the religion of Humanity, see POSITIVISM.

HUMATE, n. *hū'māt* [L. *humus*, the ground]: a compound of humic acid with a base.

HUMBER, *hŭm'bėr:* continuation and estuary of the river Ouse (q.v.).

HUMBERT, *hŭm'bėrt,* I., King of Italy: b. 1844, Mar. 14; son of Victor Emanuel, at whose death he succeeded to the throne 1878, Jan. 9. He accompanied his father during the war of Italian independence, was active in the movement for the unification of Italy after the struggles of 1859, was conspicuous in the reorganization of the ancient kingdom of the Two Sicilies, took the field on the outbreak of hostilities between Prussia and Austria, and as lieut.gen. commanding a div. in Gen. Cialdini's army, distinguished himself at the battle of Custozza 1866, June. He married his cousin, Princess Margherita of Savoy, 1868, Apr. 22. After the outbreak of the Franco-German war 1870, France withdrew its garrison from Rome, and the Italian troops, taking immediate possession, completed the unification of the kingdom. Within a year after his ascension an attempt was made to assassinate him in Naples, but he escaped unharmed. Both Humbert and his queen have made themselves very popular through Italy, particularly by their courageous visits to scenes of epidemics, floods, and other disasters. They have one child, Victor Emanuel, Prince of Naples, b. 1869, Nov. 11, and betrothed to a sister of the emperor of Germany 1889. Humbert visited the emperor of Austria 1881, and the emperor of Germany 1889, May; effected a triple alliance between those empires and his kingdom, and secured the adhesion of Turkey thereto as a protective measure against future Russian movements 1889, July 20. He was assassinated in Monza 1900, July 29.

HUMBERT, JEAN JOSEPH AMABLE: 1755, Nov. 25—1823, Feb.; b. Rouvray, France: soldier. He enlisted in the French army 1789, became maj.gen. 1794 and lieut. gen. 1798, commanded the French army sent to Ireland and surrendered to Lord Cornwallis, went to San Domingo as commander of a div. of the French army 1802, was appointed governor of Port au Prince and subsequently exiled for avowing republican principles, removed to New Orleans, and, excepting a service in Mexico, was employed till his death as a teacher.

HUMBERT SWINDLE, THE: one of the most daring and extensive frauds on record, perpetrated by a Mme. Humbert, of Paris, with the aid of various accomplices. It was alleged by Mme. Humbert that a certain Robert Henry Crawford, American millionaire, had left to her his fortune of $20,000,000. A subsequent will divided the estate between her younger sister, Marie Daurignac, and Henry and Robert Crawford, nephews of the testator, while a third document bound the heirs to the preservation of the title-deeds and securities, and placed these in the keeping of M. and Mme. Humbert until Marie should attain her majority. Without examination the alleged title-deeds and securities were deposited and sealed in a safe by the authorities. On this wholly fictitious basis Mme. Humbert obtained extensive loans. She is thought to have netted $10,000,000, while the amount of notes in the form of original loans and renewals equaled $140,000,000. The fraud was at last discovered, and Mme. Humbert and other parties to it were tried and condemned.

HUMBLE, a. *hŭm'bl* [F. *humble*—from L. *humĭlĭs*, lowly, mean—from *humus*, the ground]: lowly; modest; meek; poor, as in humble circumstances; *low*, as opposed to *high* or *great:* V. to bring down; to reduce low; to subdue; to degrade; to mortify. HUM'BLING, imp. *-blĭng:* N. humiliation; abatement of pride. HUMBLED, pp. *hŭm'-bld.* HUM'BLY, ad. *-blĭ*, in a humble manner; without pride; modestly. HUM'BLENESS, n. *-bl-nĕs.* HUM'BLINGLY, ad. *-blĭng-lĭ.*—SYN. of 'humble, v.': to abase; lower; depress; disgrace; humiliate; dishonor; sink; crush; break.

HUMBLE-BEE, n. *hŭm'bl-bē* [Dut. *hommelen*, to hum: Ger. *hummel*, a humble-bee (see HUM)], (*Bombus*): genus of *social* bees (see BEE), having a thick and very hairy body, the hairs often arranged in colored bands; and also differing from the honey-bees in having the tibiæ of the hinder-legs terminated by two spines. The species are numerous, and are found in almost all parts of the world, from the equator to the utmost polar limits of vegetation, but they seem to abound most in temperate climates. A large species is the common humble-bee (*B. terrestris*), the *Bumbee* (boom-bee) of the Scotch; it is black, with a yellow ring before the wings, and another on the abdomen, the apex of the abdomen white. Another of the largest species is the RED-TAILED BEE (*B. lapidarius*), and one of the most abundant is the yellow and orange MOSS-BEE (*B. muscorum*), the *Foggie* of the Scotch. Some of the tropical species are much larger than those in temperate climates.

Humble-bees do not form communities so large as those of honey-bees; seldom more than two or three hundred occupying one nest and in some species not more than 50 or 60. The females are much less prolific than those of honey-bees. The community is dissolved on the approach of winter, the males and workers die, and only females

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remain in a torpid state—among moss, in rotten wood, or in some other situation where they may enjoy protection from the frost, and concealment from enemies—to perpetuate the race by founding new communities in the ensuing spring. The nests of some species, as *B. terrestris,* are in holes in the ground, at the depth of a foot or more, floored with leaves, and lined with wax, and often entered by a winding passage. Others, as *B. lapidarius,* make their waxen nests among stones; while others still, as *B. muscorum,* make them among moss, which they mix and join with wax. The nests are enlarged as the community increases. Some of the eggs are deposited in balls of mingled pollen and honey, on which the larvæ feed, one ball containing several larvæ; afterward, eggs are deposited also in waxen cells. Workers are chiefly produced in the earlier part of the season, males and perfect females in the latter part of it. The females are larger than the males and workers. Humble-bees differ from honey-bees in their females existing together in the same community without seeking to destroy one another. There is among them nothing analogous to swarming. Their combs have not the beautiful regularity of structure which characterizes those of honey-bees; but cells of comparatively coarse appearance are clustered together, with silken cocoons of pupæ, balls of the kind above noticed, and open cells or pots filled with honey, the frequent prize of school-boys and youthful haymakers, who know well how to open and plunder the humble-bee's nest. Many animals also are expert in this, as badgers, foxes, rats, etc., which, however, devour the brood as well as the honey. The researches of Darwin, Müller, and others have shown that humble-bees render a very important service in the economy of nature, as the agents in plant-fertilization.

HUMBLES, or UMBLES, n. plu. *ŭm'blz* [F. *nombles*]: the entrails of a deer; generally the entrails and inferior parts of any beast: also spelled *nombles* and *numbles.* HUMBLE-PIE, n. *ŭm'bl-pī,* as in the phrase, 'to eat *humble-pie,* or *umble-pie,*' to eat one's own words; to be obliged to act in a very humiliating way—that is, to stoop, as it were, to eat a pie made of *umbles.*

HUMBOLDT, *hŭm'bōlt,* FRIEDRICH HEINRICH ALEXANDER, Baron VON: one of the greatest of naturalists, who has contributed more than any man of modern times to the progress of several departments of physical science: 1769, Sep. 14—1859, May 6; b. Berlin. His father, who died when Humboldt was not quite ten years of age, was chamberlain to the king of Prussia. He studied at the universities of Frankfurt-on-the-Oder, Berlin, and Göttingen. His love of natural history was manifest at this period; and during his residence at Göttingen (1789-90), he made visits of scientific exploration to the Harz and the banks of the Rhine, the fruit of which was his first publication, *On the Basalts of the Rhine,* etc. In the spring and summer, 1790, he accompanied George Forster

in a tour through Belgium, Holland, England, and France. 1791, June, he entered the Mining Acad. at Freiberg, where he had private instruction from Werner. His eight months' residence here led to the publication of his *Flora Subterranea Fribergensis et Aphorismi ex Physiologia Chemica Plantarum* (Berlin 1793). He was afterward appointed to an office in the mining dept., and spent some years in this capacity, chiefly at the Fichtelgebirge, Upper Franconia. His researches resulted in a work 'On the Irritability of the Muscular and Nervous Fibres, with Conjectures regarding the Chemical Process of Life in the Animal and Vegetable World' (*Ueber die Gereizte*, etc., 2 vols., Berlin, 1797-99).

The desire of visiting tropical countries, however, led him to resign his office, and apply himself to the study of nature. He spent three months at Jena, where he was the intimate associate of Goethe and Schiller, and studied anatomy under Loder. At Paris, he contracted a friendship with a distinguished young botanist, Aimé Bonpland (q.v.), afterward his companion in many and various scenes. Some time afterward he obtained permission from the Spanish government to visit all the Spanish settlements in America and the Indian Ocean, with every additional favor which could promote his researches in the various departments of natural science. He sailed from Corunna, with Bonpland, 1799, June 5. They visited Teneriffe, ascended the Peak, and made many scientific observations. July 16, they arrived at Cumana in S. America, and in the course of five years explored a vast territory in Venezuela, Granada, Ecuador, and Peru.

They travelled through tracts of the earth rich in all that could interest the scientific observer, and till then never scientifically described. They explored the regions of South America watered by the Orinoco and the upper part of the Rio Negro, fully tracing the connection between the Orinoco and the Amazon; then returned to the coast and sailed for Cuba, where they remained some months. Leaving Cuba in 1801, they returned to the South American continent, sailed up the Magdalena as far as they could, pursued their route by land to Popayan and Quito, and thence as far south as Lima, crossing the Andes five times; from Lima they sailed to Guayaquil, and thence to Acapulco, Mexico (1803, Jan.). Some months were spent in Mexico and in a visit to the United States; and in 1804, Jan., they set sail for Europe, taking Cuba again on their way. In 1804, Aug. 3, they arrived at Bordeaux, bringing with them, as the result of their labors, an immense mass of fresh knowledge in geography, geology, climatology, meteorology, botany, zoology, and every branch of natural science, as well as in ethnology and political statistics.

Humboldt resided in Paris till 1805, Mar., occupied in the arrangement of his collections and manuscripts, and with Gay-Lussac, in the laboratory of the polytechnic school, in experiments on the chemical constitution of

the atmosphere. Having visited Italy, and returned to Berlin, he accompanied Prince Wilhelm of Prussia 1807 on a political mission to France, and obtained leave from the govt. of his own country to remain there with a view to procuring the scientific co-operation necessary for the publication of his travels and for the arrangement of the vast mass of scientific materials which he had collected—for which the disturbed state of Germany at that time did not allow proper opportunity. To this task he had allotted in anticipation two years: it extended to more than 20 years, and was then incomplete. H. from the beginning of his residence in Paris was, next to Napoleon, the most famous man in Europe. He continued to reside in Paris till 1827. His great work, embodying the chief results of his travels, appeared 1807–17 in two forms, folio and quarto, each consisting of 29 vols. and containing 1,425 copper-plates. The wish of the king that he should reside in his native country was gratified 1827, when H. proceeded to Berlin; and there, in the winter of 1827–8, he gave lectures on the *Cosmos*, or physical universe.

In 1829, H. again became a traveller, Emperor Nicholas then sending out a well-appointed expedition to n. Asia, to explore the Ural and Altai Mountains, the Chinese Dsongarei, and the Caspian Sea. In this expedition, H. was accompanied by his two friends, Ehrenberg and Gustavus Rose. Its principal results were the scientific examination of the beds which produce gold and platina, the discovery of diamonds in an extra-tropical region, the astronomical determination of positions, magnetic observations, and geological and botanical collections. The whole journey occupied nine months, and extended to 2,320 miles. It is described in Rose's 'Mineralogical and Geological Travels to the Ural, the Altai, and the Caspian Sea (*Mineralogisch-geognostischer Reise*, etc., 2 vols., Berlin 1837–42), and in H.'s *Asie Centrale, Recherches sur les Chaines de Montagnes et la Climatologie comparée* (3 vols., Paris 1843). This expedition led to much increase of our knowledge of the earth's magnetism, through the adoption by the emperor of Russia of H.'s proposal for the establishment of magnetic and meteorological stations from Petersburg to Pekin; followed, on H.'s application to the Duke of Sussex, by the establishment of similar stations in the s. hemisphere

The political changes of the year 1830 led to H.'s employment in political services. He had been long on friendly terms with the members of the House of Orleans; therefore, after Louis Philippe ascended the French throne, he was chosen by the king of Prussia to carry to Paris his recognition of the new sovereign, and was during the ensuing 12 years, frequently sent to Paris to reside for four or five months. He accompanied the king of Prussia also in visits to England, Denmark, etc. During this time, he published *Examen Critique de la Géographie du Nouveau Continent* (5 vols., Par. 1835–38).

H. spent the latter years of his long life (what he used to call his 'improbable years') at Berlin, where he occupied a high position at the Prussian court. His last great work,

Cosmos (4 vols. Stuttg. 1845–58), has been unanimously recognized as one of the greatest scientific works ever published, exhibiting in most lucid arrangement many principal facts of the physical sciences, and their relations to each other. It has been translated into all the languages in which a book of science is required. The germ of the work was the author's *Views of Nature* (Ansichten der Natur, Stuttg. 1808).

It is not easy to estimate the amount of H.'s contributions to science. The geography of Spanish America was little known previous to his travels there, during which he astronomically determined more than 700 positions; and he bestowed much labor on the preparation of the maps in which his discoveries were exhibited. His barometrical observations were likewise very numerous, as well as his observations on all points connected with meteorology. To him are due the most important generalizations concerning magnetism and climate, some results of which are seen in the isothermal and other lines on our maps.

Among his botanical works, that on the geography of plants, *De Distributione Geographicâ Plantarum secundum Cœli Temperiem et Altitudinem Montium* (Paris 1817), must be reckoned the most important. It was preceded by an *Essai sur la Géographie des Plantes* (Paris 1805). The botanical discoveries made by himself and Bonpland in their American travels were given to the world in a number of works by H. and Kunth, published at Paris 1809–34. He gave to the world also his observations, many of them most valuable, which were made at the same time, in zoology and comparative anatomy; and in a magnificent vol., *Vues des Cordillères et Monuments des Peuples Indigènes de l'Amerique*, he directed the attention of Europe to the monuments of a little known antiquity in America, and showed for the first time the possibility of combining artistic beauty with scientific accuracy. He published, 1823 *Essai Geognostique sur le Gisement des Roches dans les deux Hemisphères* (Paris); and 1831, *Fragments de Géologie et Climatologie Asiatique* (2 vols. Paris). In 1811, he produced a work on political economy, *Essai Politique sur le Royaume de la Nouvelle Espagne* (2 vols.). He obtained distinction also by his labors in the determination of the magnetic equator, and by his observations on electrical eels, and on the respiration of fishes and young crocodiles. See the great biographical work, edited by Bruhns, *Alexander von H., Eine wissenschaftliche Biographie* (1872; Eng. transl. 1872).

HUMBOLDT, Karl Wilhelm, Baron von: eminent as statesman, and for his works in philology, æsthetics, and general literature: 1767, June 22—1835, Apr. 8; b. Potsdam; elder bro. of Friedrich Heinrich Alexander von H. He was educated at Berlin, Frankfurt-on-the-Oder, and Göttingen. He eagerly studied antiquities, æsthetics, and the Kantian philosophy, as well as law, to which he professedly applied himself. After travelling in Germany, France, and Switzerland, he acquired the rank of counselor of legation, but showed little inclination for official

employment, and in 1791 married, and for some years resided chiefly on his wife's estate in Thuringia, and afterward in Jena, associating most intimately with Schiller, and devoting himself to poetry and other literary and scientific pursuits. A valuable memorial of his friendship with Schiller is the correspondence between them (*Briefwechsel zwischen Schiller und Wilhelm von Humboldt*, Stuttg. und Tüb. 1830), published by him after Schiller's death. 1797–99, H. resided partly in Paris and partly in Spain; and 1801 became Prussian resident at Rome, where he remained for a number of years, in this capacity, and in that of minister-plenipotentiary, a most generous patron of young artists and men of science. From Rome he returned to his native country, to fill the high place of first minister of public instruction, in which capacity he did much to promote education in Prussia. The Berlin Univ. owned its existence to him. In 1810, he went to Vienna as minister-plenipotentiary, and from this time he took part in all the most important political affairs in which his country was concerned. After 1819 he resided chiefly at Tegel, where he laid out fine pleasure-grounds, and formed a noble collection of sculptures by the greatest masters.

His earliest literary works were collected by himself under the title 'Æsthetic Essays' (*Æsthetische Versuche*, Brunswick 1799). His 'Collected Works' appeared at Berlin (7 vols. 1841–52). H. applied himself with the greatest eagerness and assiduity to the study of philology, and produced several works on the Basque tongue, and the evidence which it affords concerning the aboriginal inhabitants of Spain—the languages of the East, and various questions connected with Oriental literature, and the languages of the South Sea Islands. One of his most important works is that 'On the Kawi Language in the Islands of Java' (*Ueber die Kawisprache*, etc., 3 vols., Berlin 1836–40), published after his death by Edward Buschmann; the introduction to which, On the Variety of Structure in Human Speech, etc., and its influence on the intellectual progress of mankind, may be said to mark a new era in the science of philology, and has given occasion to many further researches and publications. *Wilhelm von Humboldt's Briefe an eine Freundin* ('Letters to a Lady Friend,' 1847; Eng. transl., 1849), show his character in a most pure and amiable light. See the admirable biography by Haym (1856).

HUM'BOLDT River: in the n.-western part of Nevada: formed by the union of two streams which rise on the w. side of the Humboldt Mountains. It is a small and rapid stream, 350 m. in length, unnavigable even for canoes, strongly impregnated with alkaline matter, and after a westerly course, falls into a lake 40 m. in circumference, known as the Sink of Humboldt's river, which has no outlet. The banks are destitute of trees or shrubs, and the region through which it flows is one of the most barren in Utah. The Pacific railroad, traversing the United States from e. to w., runs through the valley of the Humboldt.

HUMBOLDTINE, n. *hŭm'bōl-tĭn* [after *Humboldt*]: a mineral occurring in yellowish capillary crystals in the brown-coal of Germany; oxalite or natural ferrous oxalate. HUM'BOLDTITE, n. *-tīt*, datholite or native borate of lime.

HUMBUG, n. *hŭm'bŭg* [O.E. *hum*, to impose on, and *bug*, an object of dread—probably only originating in slang, as from *hum* and *buzz* (see BUG)]: an imposition or trick played off under fair pretenses; a piece of trickery; a hoax; an unreliable person; a deceiver; an imposter: V. to impose upon; to cheat; to play off an imposition. HUM'BUGGING, imp. HUM'BUGGED, pp. *-bŭgd*. HUM'BUGGER, n. one who humbugs.

HUMDRUM. See under HUM.

HUME, *hūm*, DAVID: philosopher and historian: 1711, Apr. 26 (O.S.)—1776, Aug. 25; b. Edinburgh; son of Joseph Hume, or Home, who was a scion of the noble house of Home of Douglas, and laird or proprietor of the state of Ninewells in Berwickshire. David, being the younger son, had to make his own fortune with no assistance other than an education and the influence of his respectable family. He was educated at home and at the college of Edinburgh. At 23 years of age, he went to France, and lived in La Fleche, where he describes himself as wandering about in solitude, and dreaming the dream of his philosophy. In 1739-40, he published *A Treatise on Human Nature*. In this he developed the empirical philosophy of Locke (q.v.) and Berkeley (q.v.) to its extreme logical consequences. Starting from the premise that all knowledge originates in impressions received from the senses, and ideas which are the copies of these impressions, he attempted to show that all the ideas which we have are due to a combination or association of impressions and ideas with one another. His position is thus skepticism, and denies the possibility of any abstract knowledge at all (except in mathematics). It thus excludes the possibility of our having any knowledge of cause and effect, the self, substance, and God, and limits us to what we actually experience through the senses. Revolutionary as these doctrines were, the book attracted little attention at the time, on account, as Hume thought, of the rather hasty and unfinished style in which it was written.

Accordingly, in 1747 he published his *Enquiry Concerning Human Understanding*, and in 1751 the *Enquiry Concerning Morals*. These works are written in a much more readable style than the *Treatise*, and in them Hume avoids the more abstruse points, and softens some of the more repulsive ethical features of the earlier work, and discusses some of the consequences of his doctrine calculated to attract public attention (such as his famous attacks upon miracles, Providence, and a future life).

After a few years these works called forth strenuous replies from the theologians, who found to their conster-

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nation, that they were unable to answer them in the light of the philosophy of the day. A complete reconstruction in philosophy had first to take place. A generation of extreme philosophical activity and productiveness followed, marked in Great Britain by the rise of the Scottish School, and in Germany by the critical philosophy of Kant.

Hume's work in philosophy was almost wholly destructive. In developing 18th c. empiricism (q.v.) to its logical conclusions, he fell into various absurdities, many of which he admitted with astonishing candor. Perhaps no other philosopher has ever been so calm and open minded, ready even to point out the faults in his own system, and so willing to allow his arguments to rest upon their merits. His analysis is always wonderfully acute, and he is considered by many to be the greatest of British philosophers. He certainly set the philosophical world to thinking to a greater extent than any of his predecessors, and some trace the rise of modern positivism (q.v.) and utilitarianism (q.v.) to Hume. In his 35th year, he had unsuccessfully competed for the chair of moral philosophy in Edinburgh, and at this period we find him unsuccessful also in an attempt to obtain the chair of logic in Glasgow. Next year, 1752, appeared his *Political Discourses*. Here, again, he made an era in literature, for in this little work he announced those principles of political economy comprehending the doctrine of free-trade, which it fell to his friend Adam Smith more fully and comprehensively to develop. He was appointed at this time keeper of the Advocates' Library, with a very small salary, which he gave to a charitable purpose. It was here that, surrounded with books, he formed the design of writing the history of England. In 1754, he issued a quarto vol. of *History of the Stuarts, containing the reigns of James I. and Charles I.*, and presently completed this portion of the work in a second vol., bringing it down to the Revolution. He then went backward through the House of Tudor, and completed the work from the Roman period downward, 1762. While so employed, he published *Four Dissertations: the Natural History of Religion; of the Passions; of Tragedy; of the Standard of Taste* (1757). Two other dissertations, intended to accompany these, were cancelled by him after they were printed—they are *On Suicide* and *The Immortality of the Soul*, and were subsequently printed in his works.

In 1763, he went to France as sec. to Lord Hertford's embassy; here he was in his element, and found fame at last. He became familiar with the brilliant wits and savants of the Parisian circle—with Turgot, D'Alembert, Helvetius, Holbach, Diderot, Buffon, Malesherbes, Crebillon, and the rest, as well as with the no less eminent women, De Boufflers, Page de Boccage, Geofrin, Du Deffand, and L'Espinasse. His sojourn in Paris was

various construction are attached to threshing-machines, in all of which blunt knives are made to pass frequently through the grain.

HUMMING-BIRD, *hŭm'ĭng-bĕrd* (*Trochilus*): Linnæan genus of birds, now constituting a family, *Trochilidæ*, of order *Insessores*, tribe *Tenuirostres*. The species are numerous, more than 300 being known, while new ones are continually being discovered. They are found only in America and its islands, though represented, both in habits and in brilliancy of plumage, by the Sun-birds (q.v.) of eastern tropical regions. Most of them are tropical, though a few species are summer visitants of the colder parts of America, seldom, however, beyond lat. 57° n.; while some of those found only within the tropics inhabit elevated mountainous tracts, even to the confines of perpetual snow. The dazzling brilliancy of humming-birds, the extreme rapidity with which they dart through the air, their hovering above the flowers from which they obtain their food, with humming sound of wings, which move so quickly as to be indistinctly visible, or, 'like a mist,' have attracted admiration since the discovery of America. The diminutive size of almost all—some of them being the smallest of birds, and if stripped of their feathers, not larger than a humble-bee—has further rendered them objects of interest, while the plumage of the different species exhibits an almost endless variety of forms, as well as of colors, in crests, neck-tufts, leg-tufts and many an extraordinary development of tail.

They have slender bills which are also generally long, and in some extremely so, the form of the bill showing wonderful adaptation to the kind of flowers from which the bird obtains its food—straight in some, curved in others. They do not, as was long supposed, feed on honey alone, but largely, some perhaps chiefly, on insects, not rejecting spiders; and they often snatch away the insects entangled in spiders' webs. The lower mandible fits into the upper, and the bill is thus adapted as a tube for sucking, in which, as well as in seizing small insects within the recesses of flowers, the tongue also is a very efficient organ. The tongue is very long, and capable of being darted out to a still greater length; the bone of the tongue (*hyoid bone*) being much elongated, and its branches passing round the back of the skull to the forehead, where they meet in a point before the line of the eyes. The tongue itself consists of two filaments, joined together for the greater part of their length, and separated at the tip. The wings are very long and powerful, the first quill-feather the longest, the rest shorter in succession. They construct their nest with nice art, generally of lichens and fibrous substances such as cotton: they lay no more than two eggs. They are very bold in defense of their nests and young, and are said to strike fearlessly with their needle-like bills at the eyes of birds

of prey, which they far surpass in agility and rapidity of flight. They have indeed remarkable pugnacity. They are easily tamed and rendered familiar, and have been known to return again in spring, after a winter migration to a warmer climate, to the window from which they had been allowed to escape. Attempts to keep tamed humming-birds have generally failed, perhaps through starvation on account of their being supposed capable of feeding only on honey or syrup, whereas insect food seems necessary for them. Attempts made to take them across the Atlantic have, in most cases, been unsuccessful. The Ruby-throated humming-bird (*Trochilus colubris*) is the only species found in the n. Atlantic states. It ventures even into the regions of the Hudson's Bay Company. One of the greatest authorities on the humming-bird is Gould, whose work is magnificently illustrated.

HUMMOCK, n. *hŭm'mŏk* [Norw. *hump,* a knoll, a piece of land]: a hillock or eminence of land, as seen from the sea or a distance; among *sailors,* a large mass of floating ice.

HUMOR, n. *hū'mėr* [L. *hūmor,* fluid of any kind, moisture—from *hūmērĕ,* to be moist: OF. *humor;* F. *humeur*]: any moisture or fluid of the body except the blood; now usually restricted to any moisture of the body; certain fluids of the eye. HU'MORAL, a. *-ăl,* pertaining to the fluids or humors of the body, or proceeding from them; in *med.,* applied to that old doctrine which ascribed all diseases to a degenerate or disordered state of the fluids of the body—see note under title next below. AQUEOUS HUMOR, the watery matter which fills the space in the fore part of the eyeball between the cornea and the iris.

HUMOR, n. *hū'mėr* [F. *humeur*—from L. *hūmōrem,* fluid, moisture (see HUMOR, above)]: turn or temper of mind; the talent which perceives and generalizes the peculiarities of persons or circumstances in a witty and kindly manner; caprice; present disposition; in *OE.,* practice: V. to gratify by yielding to a particular inclination or desire; to indulge. HU'MORING, imp. HU'MORED, pp. *-mėrd.* HU'MORLESS, a. without humor. HU'MORIST, n. *-mėr-ĭst,* one who has a playful fancy for odd peculiarities and circumstances; a wag or droll fellow. HU'MOROUS, a. *-ŭs,* fitted to excite laughter; fanciful; playful. HU'MOROUSLY, ad. *-lĭ.* HU'MOROUSNESS, n. oddness of conceit; capriciousness. HU'MORSOME, a. *-sŭm,* odd; peevish; petulant. HU'MORSOMELY, ad. *-lĭ. Note.*—The terms 'good humor' and 'bad humor' are derived from the old 'humoral pathology,' according to which there were four principal moistures or *humors* in the body—namely, *choler, melancholy, phlegm,* and *blood,* on the due proportion and combination of which the disposition of body and mind depended, and thus the 'humors or

temperaments' were reckoned four—viz., 'choleric, melancholic, phlegmatic, and sanguine,' produced respectively by *choler, melancholy, phlegm,* and *blood:* see MEDICINE, HISTORY OF.—SYN. of 'humor, n.': moisture, temper, disposition; jocularity; merriment; wit; satire; pleasantry; mood; frame; fancy;—of 'humorous': moist; damp; dewy; humid; capricious; irregular; whimsical; pleasant; jocular; jocose; merry; witty.

HUMP, n. *hŭmp* [Dut. *hompe,* a hunch, a piece cut from something—from *hompen,* to cut off the extremities of a thing: O.Sw. *hump,* a piece of land]: the protuberance formed by a crooked back, as that on a camel. HUMP'BACK, n. *-băk,* one with a crooked back. HUMP'-BACKED, a. *-băkt,* having a crooked back.

HUMPHREYS, ALEXANDER CROMBIE: an American educator; b. in Edinburgh, Scotland, 1851; came to the United States 1859 and 1865 obtained an appointment to the U. S. Naval Academy, passed entrance examination, but was refused admission, being too young; was graduated at Stevens Institute of Technology 1881, shortly afterward becoming chief of the Pintsch Lighting Co. In 1885 he became general superintendent of the United Gas Improvement Co.; 1892 established the firm of Humphreys and Glasgow in London; 1894 established the New York branch. He was elected president of Stevens Institute 1902, June 5, and inaugurated 1903, Feb. 5.

HUMPHREYS, *hŭm'frĭz,* ANDREW ATKINSON, LL.D.: 1810, Nov. 2—1883, Dec. 27; b. Philadelphia; soldier. He graduated at the U. S. Milit. Acad. 1831; served in the Seminole Indian war; resigned his commission 1836; was employed by the govt. as civil engineer the same year; reappointed to the army 1838; promoted capt. 1848; maj. 1861, Aug.; col., brig.gen. of vols., and chief topographical engineer of the Army of the Potomac 1862, Apr.; maj.gen. of vols., and chief of staff to Gen. Meade 1863, July 8; brevetted maj.gen. U.S.A. 1865, Apr. 6; resigned from the vol. service 1866, Aug. 31; appointed chief of engineers U.S.A. with rank of brig.gen. 1866, Aug. 8; and was retired 1879. He was an original member of the National Acad. of Sciences, member of numerous learned bodies, author of several historical and technical works, and received the degree LL.D. from Harvard Univ., 1868.

HUMPHREYS, DAVID, LL.D.: 1752, July—1818, Feb. 21; b. Derby, Conn.: soldier and poet. He graduated at Yale College 1771; served through the revolutionary war, was aide to Washington, and was voted by congress a sword for gallantry at Yorktown; was appointed sec. to the American commissioners to negotiate treaties with European powers 1784; first U. S. minister to Portugal 1790, and minister to Spain 1797; became brig.gen. of the Conn. veteran vols. 1812; and afterward engaged in woolen manufacture. He lived with Washington at Mount

Vernon several years, and during and after the revolutionary war wrote many stirring and patriotic poems. He received the degree LL.D. from Brown Univ. 1802, and Dartmouth College 1804, and became a fellow of the Royal Soc. of London.

HUMPTY-DUMPTY, n. *hŭm'tĭ-dŭm'tĭ* [Eng. *hump,* a protuberance; *dump,* a short fat piece]: a short, thick, round-shouldered person; a fat dwarf.

HUMULIN, n. *hū'mū-lĭn* [*Hum'ŭlŭs lup'ŭlŭs,* the systematic name of the hop plant—from L. *humus,* the ground]: the narcotic principle of the hop.

HUMUS: dark colored, amorphous material contained in soils, in varying proportion. Similar bodies can be prepared artificially, as for example, by the action of hydrochloric acid on certain sugars. Humus has an acid reaction and its presence or absence has an important bearing on the fertility of the soil and on the capacity of the latter for holding moisture. The exact part which it plays in plant economy is still rather obscure.

HU-NAN, *hô-nân':* province in the lake district of China, on the s. side of Tung-ting-hu, the largest lake in China. It is fertile, yielding two crops of rice annually. Its mountains yield malachite, iron, lead, and coal. Area, 74,320 sq. m. Pop. 18,652,507.—Its cap. is Chang-sha-fu, on the river Siang.

HUNCH, n. *hŭnsh* [Dut. *hompe,* a lump: Norw. *hump,* a knoll (see HUMP)]: a hump or protuberance; a lump or thick piece; a push or jerk, as with the elbow: V. to push or jostle, as with the elbow. HUNCH'ING, imp. HUNCHED, pp. *hunsht.* HUNCH'BACK, n. one with a lump on the back. HUNCH'BACKED, a. *-băkt,* having a crooked back.

HUNDRED, n. a. *hŭn'drĕd* [Icel. *hundrad;* Ger. *hundert,* a hundred—from Icel. *hund,* ten; *raed,* a reckoning: comp. Gr. *hekaton;* L. *centum;* W. *cant;* Gael. *ceud;* Ir. *ccad,* a hundred]: ten multiplied by ten; a number consisting of ten times ten; in *commerce,* a variable amount of different kinds of goods; a division of a county in England. HUN'DREDERS, inhabitants of a hundred (q.v. below). HUN'DREDTH, a. *-drĕdth,* the one part or division of anything divided into a hundred parts. HUN'DREDFOLD, n. a hundred times as much. HUN'DREDWEIGHT, n. *-wāt,* 100 or 112 lb.—contr. into *cwt.* HUNDRED DAYS, in *F. hist.,* period 1815, Mar. 20—June 22, from the time when Napoleon escaped from Elba and reached Paris, to the time when he abdicated in favor of his son.

HUNDRED, *hŭn'drĕd,* in English Law: ancient subdivision of counties, whose origin is not clearly settled, though probably the name arose from there being a hundred sureties in each to keep the peace. The hundred was intermediate between a parish or township and a county —the counties in England being large in extent and population. Between the hundred and the county was sometimes a further intermediate division, the trithing,

now called the riding, soke, the lathe, or the rape. In ancient times, if a crime was committed, such as robbery, maiming of cattle, burning of stacks, etc., the hundred had to make it good. The old distinctions have now become almost obsolete. But the characteristic of a hundred is still this, that it has a constable or bailiff, and when any damage is done by rioters feloniously destroying property, the individual owner has his remedy by suing the hundred for the damage. In order to secure this remedy, the party or his servant must, within seven days, go before a justice, and state on oath the names of the offenders, and engage to prosecute them. So, where there is no hundred, the county, or city, or town, is liable in like manner, and in all cases the expenses are paid by the county rate, or a rate in the nature of a county rate. In the n. counties, a hundred is generally called a wapentake, a term which probably had originally a military reference. See RIOT.

HUNDRED YEARS' WAR: the name given to the prolonged struggle between France and England which began in 1337 and ended in 1453. Among the chief of the immediate causes of the war was Edward III.'s claim to the French throne, but the keen rivalry of the two nations rendered conflict inevitable. It lasted during the reigns of five English kings, from Edward III. to Henry VI., and of five French kings, from Philip VI. to Charles VII., ending in the expulsion of the English from France.

HU'NEKER, JAMES GIBBONS: American musical and dramatic critic; b. Philadelphia 1860, Jan. 31. In Paris he was a pupil of Barili, Ritter, and Dontreleau, and subsequently became an instructor in piano at the National Conservatory of New York. He was musical and dramatic critic of the New York *Recorder* in 1891-5; of the *Morning Advertiser* in 1895-7; and musical editor, and from 1902 dramatic editor of the New York *Sun*. He wrote: *Mezzotints in Modern Music* (1899); *Chopin, as Man and Musician* (1900); *Melomaniaes* (1902); *Overtones* (1904); *Visionaries* (1905); etc.

HUNGARIAN GRASS (*Panicum Germanieum*): annual plant of the millet family, cultivated for forage. It grows rapidly, and on rich land produces large crops. It is valuable for feeding green or for curing as hay. Hungarian grass should be sown June 1—15 in a mellow soil. It succeeds on inverted sod if the surface is thoroughly pulverized. A moderate dressing of fine manure, wood ashes, or commercial fertilizer, will largely increase the crop. Three pecks of seed per acre suffice. If designed for hay it should be cut when the heads appear. For green fodder it can be used as soon as large enough to feed. It requires from two to three days in which to cure. If fed in large quantities it sometimes proves injurious, but when fed lightly, in connection with other hay, it is excellent for both cattle and horses.

HUNGARY, *hŭng'ga-rĭ* [Ger. *Ungarn;* Magyar, *Magyar Ország* (Land of the Magyars)]: one of the two portions of the Austro-Hungarian empire. According to the fundamental laws of the realm, the emperors of Austria are kings of Hungary, which formerly comprehended Hungary proper, Croatia, Slavonia, Dalmatia, the Illyrian sea-coast, Transylvania, and the whole of the military frontier. After 1848, these pendicles were dissociated administratively from Hungary proper and converted into crown lands. Since 1867, Hungary, Croatia, Slavonia, Transylvania, and the Military Frontiers, have constituted the kingdom of Hungary, one member of the bipartite empire. The two knots which tie Austria proper and Hungary together are the person of their common sovereign and the 'Delegations'—a parliament of 120 members, of which 60 are supplied by either portion of the empire. This body legislates for war, finance, and foreign affairs; and the ministers of these three departments are responsible to it. Hungary, with Transylvania, Croatia, and Slavonia, has 125,039 sq.m. Pop. (1900) 19,254,559.

For the general features of the country, see AUSTRIA. The soil of the vast plains consists chiefly of humus and clay, and is of great fertility. Huge tracts of sand are found in several parts; there are also swamps all along the Theiss. The level tracts in the e. part of Hungary are subject to periodical drought, and to frequently recurring blasts. The heat is sometimes so great, that it is impossible to walk with bare feet on the burning sand. Autumn and winter are of short duration. In spring, great part of the level land becomes an almost impassable ocean of mud. Hail storms during summer, and the severity of cold during winter, cause much anxiety to farmers, especially to the numerous vine-growers. Ague is common in some regions, but the climate as a whole is healthful.

Hungary is an agricultural country in the main, though the methods of cultivation are exceedingly defective. In many places the ground is not even manured. In Hungary proper, exclusive of Transylvania, Croatia, and Slavonia, about $\frac{1}{12}$ of the whole soil is unproductive, $\frac{1}{3}$ is arable land, $\frac{1}{4}$ is wooded, $\frac{1}{4}$ in pasture, $\frac{1}{71}$ appropriated to culture of the vine. Magnificent forests clothe all the hilly regions; yet in the low country wood is so scarce that dung has to be used for fuel. Grain is produced in abundance, and beyond what is needed for home consumption. The order of importance of the various kinds is oats (of which $\frac{1}{3}$ is exported), barley, rye, maize, and wheat. Vast quantities of hemp and flax are raised. For more than 150 years tobacco has been raised in Hungary. Large quantities are still grown: the sale is a government monopoly. Potatoes are little used for food save by Germans, but are available for making spirits. The culture of fruit is left almost wholly to the Germans, and is

very productive in their hands; the fine climate brings, e.g., no less than 50 kinds of peaches to perfection. In many parts of Hungary, figs, almonds, and even olives thrive. Wine is one of the most important sources of Hungarian comfort and wealth. Only France excels Hungary in the quantity of wine produced; the total production is estimated at 400,000,000 gallons, and could be much increased. But the system of culture, and the methods used in preparing the wine are so primitive and imperfect, that not over 50,000,000 gallons can be made fit for export. The wine of Hungary was used in England in the days of James I. The finest Hungarian wines are the yellowish brown Tokay (to the production of which more than 100 sq.m. of land are given), a dark red wine called Menes, and the well-known Ruster dessert-wine. Cattle-breeding is a great source of trade; and enormous numbers of swine, and of geese and ducks are kept. Horses are carefully reared in Hungary. Silk-breeding has rapidly developed of late; in 1883, it was pursued in 430 communes. Rice-planting is on the increase. More than 100 agricultural societies, in 1883, testified to enterprise in this department. Chamois, bears, and wild boars are still found. Red deer abound, as do fowls and fish of all descriptions. In its minerals, Hungary has vast sources of wealth. Russia alone surpasses Hungary for its richness in the noble metals; considerable quantities of gold and silver, generally mingled, are found in Hungary. Copper and iron are largely produced. Antimony, cobalt, and arsenic are wrought, as are salt, soda, natural saltpetre, and alum. Opals and amber occasionally appear; marble and alabaster, coal, pitch, and graphite are available in various districts. In industry, Hungary is yet far behind; a little of the commoner kinds of linen and woolen cloths, leather, sugar, glass, paper, and spirits are its chief manufactures. The trade in grain, flour, sheep, wool, and skins is brisk. Of the total population, more than 5,000,000 are engaged in agriculture and mining, 65,000 in industrial work, 134,000 in trade, and nearly 180,000 in professional pursuits. Hungary has few good roads; the rivers, especially the Danube, are the great channels of communication. About 8,000 m. of railway are in operation. Besides Budapest (Pesth), the capital, with pop. (1900) 732,322, there are in Hungary six cities of 50,000 inhabitants or more, and fourteen others with more than 30,000.

With regard to popular education, attendance in elementary schools is compulsory from the completion of the sixth year (in Croatia and Slavonia the seventh) till the completion of the twelfth, and also in continuation-schools up to the age of 15. Every parish or commune is also bound to maintain an infant school. The great bulk of the schools are supported by the denominations. Besides gymnasiums and real-schools there are numerous technical schools for arts and industries of all kinds.

There were (1902) 3 universities with 485 professors and 7,839 students, viz.: at Budapest (professors 307, students 5,339); at Klausenberg (professors 101, students 1,592); at Agram (professors 77, students 908); also, 49 theol. colleges (Rom. Cath. 29, Orthodox Greek 5, Prot. 10, Jewish 1, total students 1,159); 11 law schools (total students 1,679); 558 special technical institutes (commercial, agricultural, mining, musical, etc.); 175 gymnasia (students 53,259); 672 realschulen (students 9,355); 18,568 elementary schools (teachers 31,663, pupils 2,621,340). Learned societies and associations for promotion of Hungarian literature exist. Newspapers and periodicals to the number of 1,499 appear regularly; of these more than half are Magyar, about 30 are Slavic, one-fourth are German, and two or three Rumanian.

In no other European country is there such a mixture of races differing in blood, speech, and manners. In Hungary proper about 50 per cent. of the whole population is Magyar; Slavic (including Slovaks, Ruthenians, Croats, and Serbs), 20 per cent.; German, 14; Rumanian, 17; Jew, 1½; Gipsy, ½. In Transylvania the number of various elements is as great, Rumanians forming here three-fifths of the whole, and the Magyars being about half as many. In Croatia and Slavonia naturally Slavs have the predominance; 98 per cent. of the whole being Croat or Serb (bitterly hostile to Magyar domination). The town of Fiume, which has since 1870 been attached to Hungary, is quite German in character. In 1900 pop. of Hungary in wide sense contained 9,846,533 Rom. Cath.; Evang. (Lutherans and Calvinists), 3,703,888; United Greek, 1,843,634; Orthodox Greek, 2,799,846; Unit., 68,005; Jews, 846,254; also minor sects. Divisions of race coincide to a large extent with religious distinctions. All Hungarians, Germans, and Slovaks, as also the Croats in Hungary, are either Rom. Cath. or Prot.; Rumanians, Ruthenians, and Serbs, are either United or Orthodox Greeks. In Hungary, Transylvania, Croatia, and Slavonia, the Rom. Cath. Church has five abps. and 20 bishops; 203 monasteries, with 2,417 inmates, and 80 nunneries with 1,136 nuns. The Greek Catholics are under an abp. and seven bishops, and have nine monasteries. The Orthodox Greeks have two abps. and seven bishops, and have three monasteries. The Lutherans and Calvinists have each five superintendents or overseers of ecclesiastical districts. The Unitarians have but one.

History.—The Hungarians—in their own language, Magyars—sprang from that group of Tartaric races to which the Turks also belong (see TURANIAN LANGUAGES); their ancient seats being in central Asia. Part of the people emigrated in the direction of the Ural Mountains, and thence, pressed by the warlike swarms of Paimacitae, to the regions now known as Moldavia and the Ukraine. In 889 forty thousand families, counting more than 200,000 warriors among them, left their homes under the

leadership of Almos, and after many a hard battle arrived at the n.e. frontiers of the land, which, under the name of Pannonia, contained several independent realms, such as Great Moravia, the Slavo-Bulgarian kingdom of Zalan, etc. The great task of conquest being now at hand, old Almos resigned, and his son Arpád being unanimously elected chief, the armed invasion began at once in several directions. At the end of 899, Arpád's sway extended from the Carpathians down to Servia, and from the e. borders of Transylvania to the foot of the Styrian mountains. According to a covenant between Arpád and the other chiefs, the leadership was to remain with the descendants of the former as long as they should keep faithful to the nation. The foundations then laid for the political organization of the realm have been developed through lapse of time into that system of municipal independence which has outlived the storms of nearly a thousand years, and contains, even after the disastrous issue of 1849, the germs of future national greatness. The periods into which the history of Hungary is divided are: 1. Period of chiefs of the House of Arpád (894-1000); 2. Period of kings of the House of Arpád (1000-1301); 3. Period of kings from different (foreign) families (1301-1526); 4. Period of kings of the House of Hapsburg (1526 to the present day). The first king of Hungary was Stephen I., called the Saint; he was crowned, 1000, with a crown that had been sent to him by the pope, Sylvester II. It forms to-day the upper part of 'the sacred crown of Hungary.'

With St. Stephen, a new era began for Hungary; Christianity took the place of heathen superstitions, the savage incursions, by which *the people of the east* had become a scourge to neighboring nations, ceased entirely. The House of Arpád gave 20 kings to Hungary, the greatest of whom undoubtedly was St. Stephen I., who, besides dividing the realm into ten bishoprics, more completely developed the administrative system. Among his successors, Béla I. (reigned 1061-63) distinguished himself by saving the hardly begun Christian civilization against the rebellious attempt of a numerous party. Ladislaus I. is renowned for wise legislation and for great personal valor. Such was the fame of his deeds, that at the council of Piacenza (1095) he was unanimously elected leader of the crusade to Palestine. Death prevented the hero from accomplishing the task. Coloman (reigned 1095-1114) went by the name of 'Learned,' and many of his laws show how much he was in advance of the age. Gejza II. (reigned 1141-61) was but ten years old when crowned; nevertheless, his reign is worthy of mention, for it was then that colonists from Flanders settled in Northern Hungary, as also in Transylvania; in consequence of which, mining and several branches of industry made rapid progress. Andrew II. (reigned 1205-35) is known in connection with the Crusades; the Hungarian

Magna Charta (Bulla Aurea), forced from him by his nobles, dates from 1222. Béla IV. (reigned 1235-70) showed great qualities in subduing the indomitable arrogance of the oligarchy, and in healing the wounds of his people after the terrible invasion of the Mongols 1242. Andrew III. was the last male scion in the Arpád line; he died without issue 1301. During the mixed period, two kings, besides the governor Hunyady (q.v.) especially distinguished themselves. Lewis I., called the Great (reigned 1342-81), was the second king from the House of Anjou, being by his great-grandmother connected with the Arpád dynasty. He extended the sway of the Hungarian sceptre to limits formerly unknown; re-established at home the authority of law, trodden down by the mighty oligarchs under his predecessors; and promoted science, industry, and commerce. One of the remarkable episodes of his reign was the expedition to Italy to punish the assassins of his unfortunate brother, Andrew, spouse of the famous Joan of Naples. Sigismund (reigned 1387-1437) is better known as Emperor of Germany. A curious incident in the life of a sovereign, was his imprisonment at Siklós during six months; he was released only after he had taken the oath to his Hungarian subjects, vowing fidelity to the constitution. Mathias I.—better known by the name of Mathias Hunyady or Mathias Corvinus (see MATHIAS)—may be said to have been not only the greatest king of Hungary, but also the greatest sovereign of his age; he reigned 1458-90. By his valor, sagacity, and love of learning, he raised his nation to the pinnacle of fame. From the death of Mathias to the day of Mohács, Hungary exhibits the fiercest strife of factions—a protracted agony, preceding the loss of national independence. Among the many calamities during the reign of Vladislas II. of Bohemia (reigned 1490-1516), the Peasant War is prominent. Dózsa and his bands, after having committed great havoc, were exterminated by the famous John Zapolya of Transylvania, *and the whole of the peasantry reduced to a state of serfdom.* Lewis II. was but ten years old at the death of his father, Vladislas II. Another ten years of rapid disorganization was required to make a disaster like that of Mohács possible: see MOHÁCS, BATTLE OF. The further history of Hungary is indissolubly connected with that of the Austrian empire: for its principal features see AUSTRIA.

Fundamental Laws of Hungary.—1. The Golden Bull of Andrew II., given 1222, on the return of the king from Palestine, contains 31 articles, of which article 2 is a kind of Habeas Corpus Act, but for nobles only. One clause of article 31, declaring armed resistance to any illegal acts of the king not punishable by law, was cancelled by article 4 of the diet 1687.

2. Treaty of Peace of Vienna 1606; concluded June 23 between Mathias II. and Stephen Bocskay. Article 1

enacts freedom of worship to Protestants, as far as is consistent with the established rights of the Rom. Cath. Church.

3. Treaty of Peace of Linz, enacted during the diet of 1646-7. Public worship is once more secured to Protestants, such freedom being for the first time extended also to the peasants. Protestants were to be admitted to public functions on an equal footing with Rom. Catholics.

4. The Pragmatic Sanction, contained in article 2 of the diet of 1722-3. In case there should be no male issue in the dynasty of Hapsburg, the females and their descendants are to succeed to the Hungarian throne. The king must be a Rom. Catholic, must take oath to the constitution, and sign the so-called *diploma inaugurale,* thus confirming the rights and privileges of the nation. Should there be no descendant, male or female, of the reigning House, the freedom of electing their king belongs to the nation.

Article 11 of 1741. Maria Theresa, abandoned by her allies, surrounded on all sides by fearful dangers, won the love of the Hungarian nation by acceding to their just and legitimate claims. The government of Hungary was confided to Hungarians only; in public affairs, the Primate, the Palatine, and the Ban were to be consulted. Hungarians were to be eligible for seats in the ministry. Article 17 of 1790-1 renews these enactments.

Article 10 of 1790-1 establishes the independence of the Hungarian kingdom with its annexed parts. *Article 12 of the same year declares that the power of making, changing, and interpreting laws in the kingdom of Hungary belongs to the sovereign legitimately crowned, together with the diet legally convened. Nothing can be done in Hungary by means of royal letters patent.* Article 13 orders that the diet shall be convoked at least once every three years.

Article 16 guarantees the nation the use and culture of the Magyar tongue.

Article 19 secures to the diet the right of voting taxes and of fixing the number of recruits.

Till 1848, the nobles were free from contribution and military service; they occasionally gave subsidies; and in case of extreme necessity, rose in arms for the defense of the country. Article 8 of 1847-8 enacts the great principle, that all classes are to participate in the public burdens of the realm. Article 9 abolishes statute labor; the peasants could thenceforward become owners of real property; and indemnity was given to their former masters. Article 5 of 1847-8 establishes the principle of popular representation on the basis of taxation.

In 1860, the decree of 1849, declaring that Hungary had by the rebellion forfeited its national constitution, was formally repealed, and the old constitutional system was restored. And 1867, June, the Emperor of Austria

solemnly swore to maintain the constitution, and was crowned King of Hungary.

The Hungarian Reichstag or Diet consists of the House of Magnates and the House of Representatives. The lower House is composed of representatives of the towns and rural districts. It is elected by the votes of all citizens of age who pay direct taxes to the amount of 16s. a year. Neither electors nor their representatives are affected by any distinction of race or religion. In 1906 an agreement between the Hungarian cabinet and the Emperor made provision for the election of the parliament by universal suffrage, and large demonstrations in favor took place among the people.

Hungarian Language and Literature.—Notwithstanding the general sympathy that prevails for Hungary, many are of opinion that the Hungarians are but a half-civilized people, or that their language and literature are in some sense Germanic or Slavonic. But the Magyar tongue is as much distinct from German or Slav, as is the French or Italian. The language of the Hungarians is called Magyar, and forms, with the Mogul, the group Ugri, belonging to the great Finnic family. As to its syntax, the language is nearest to the Turkish. Among its characteristics may be noted that the Christian name occupies always the second place; e.g., Hunyady János= John Hunyady. How rich in expressions, how abundant in classic beauties that language is, may be collected from the fact that though it was excluded from public life during eight centuries (Latin being used in schools, legislation, and administration), Hungary possesses today a literature, which, both in quantity and quality, will bear comparison with that of the most civilized western nations. Especially as regards poetry, the names of Kisfaludy, Vorösmasty, Petöfi, Arany, etc., are worthy of being ranked with the best in other lands. For further information on this interesting subject, consult Toldy's admirable *Handbook of Hungarian Literature,* published both in Magyar and in German.

HUNGARY, a. *hŭng′ga-rĭ* (also HUNGARIAN) pertaining to or obtained from Hungary. HUNGARY BALSAM, a kind of turpentine from the mountain-pine of Hungary. HUNGARY WATER, a distilled water; celebrated perfume, for whose preparation various recipes have been given. The following is one of the best: Take of fresh rosemary in blossom, 4 pounds; fresh sage in blossom, 6 ounces; ginger in slices, 2 ounces; cut them in small pieces, mix, and add rectified spirit 12 pounds, and common water 2 pints. Let 11 pints distil by a gentle heat. A hermit is said to have given the original receipt to a queen of Hungary, and hence it was called *Queen of Hungary's Water,* abbreviated into Hungary Water. It is employed principally as a perfume for the toilet; but it is sometimes taken internally as a restorative and

stimulant, and it may be used externally as a gently stimulating liniment.

HUNGER, n. *hŭng'gėr* [AS. and Dan. *hunger;* Icel. *hungr,* hunger: Goth. *huhrus,* hunger—whence *hugrjan,* to hunger]: the uneasy sensation caused by want of food; desire for food (see DIGESTION); any eager or violent desire: V. to feel the pain of hunger; to crave food; to long for. HUN'GERING, imp.: N. the suffering from hunger. HUN'GERED, pp. *-gėrd:* ADJ. pinched by want of food; suffering from hunger. HUN'GERER, n. *-gėr-ėr,* one who. HUNGRY, a. *hŭng'grĭ,* having a keen appetite; feeling hunger; looking thin and eager; greedy; poor. HUNGRILY, ad. *hŭng'grĭ-lĭ.* HUNGERLY, a. ad. *hŭng'ger-lĭ,* in *OE.,* in want of nourishment. HUN'GER-BIT, a. *-bĭt,* or HUN'GER-BITTEN, a. *-bĭt'n,* pained or weakened from the effects of hunger. HUN'GER-STARVE, v. *-stârv* [Eng. *starve*]: in *OE.,* to starve with hunger; to pinch for want of food.

HUNINGEN, *hü'nĭng-en* (French *Huningue*): small town in s. Alsace, on the left bank of the Rhine, 37 m. s.s.e. of the town of Colmar. Pop. 2,000. This place, still remarkable for its pisciculture, was formerly the centre of the French system. A series of buildings and artificial ponds, covering 70 imperial acres, was constructed 1852-54 for the breeding and acclimatizing of foreign fish. The total cost was abt. $50,000. The expense of carrying on the plan 1853-62, amounted to abt. $65,000, and the annual cost after the latter year averaged about $10,000. This establishment enabled the French govt. during the second empire to re-stock many of the barren rivers of France with valuable fish. See PISCICULTURE.

HUNKS, n. *hŭnks* [a probable corruption of *huckster*]: a covetous, miserly man; a niggard.

HU'NOOMAN. See HANUMAN.

HUNS, n. plu. *hŭnz* [*Hunni,* Gr. *Ounnoi* and *Chounoi*]: savage and powerful nation of n. Asia, which in the 5th c. overran a large portion of the Roman empire; eventually, under Attila, the most renowned of its leaders, bringing the empires of both the East and the West to the very verge of destruction.

The Huns were of Asiatic origin, and, in all probability, of the Mongolian or Tartar stock; therefore akin to, and perhaps identified with, the Scythians and Turks. No close connection has been traced between the Huns and the Magyars or Hungarians: the name Hun seems to have been applied loosely to various tribes. According to De Guignes, whose theory was accepted by Gibbon, the Huns who invaded the Roman empire were lineally descended from the Hiong-nou, whose ancient seat was an extensive but barren country immediately n. of the great wall of China. About B.C. 200, these people overran the Chinese empire, defeated the Chinese armies in numerous

engagements, and even drove Emperor Kao-ti himself to an ignominious capitulation and treaty. During the reign of Vou-ti (B.C. 141-87) the power of the Huns was much broken. Eventually, they separated into two distinct camps, one of which, amounting to about 50,000 families, went southward, while the other endeavored to maintain itself in its original seat. This, however, it was very difficult for them to do; and at length the most warlike and enterprising went w. and n.w. in search of new homes. This seems the beginning of the authentic history of the Huns in Europe, abt. 372. Of those that went n.w., a large number established themselves for a while on the banks of the Volga. Then crossing this river, they advanced into the territories of the Alani, a pastoral people dwelling between the Volga and the Don. The Alani, who had long dwelt in these plains, resisted the incursions of the Huns with much bravery and some effect, until in a bloody and decisive battle on the banks of the Don, the Alan king was slain, and his army utterly routed; after which the vast majority of the survivors joined the invaders.

The Huns are described as of dark complexion, almost black; deformed in appearance, of uncouth gesture, and shrill voice. 'They were distinguished,' says Gibbon, 'from the rest of the human species by their broad shoulders, flat noses, and small black eyes deeply buried in the head; and as they were almost destitute of beards, they never enjoyed either the manly graces of youth, or the venerable aspect of age. A fabulous origin was assigned worthy of their form and manners—that the witches of Scythia, who for their foul and deadly practices had been driven from society, had copulated in the desert with infernal spirits; and that the Huns were the offspring of this execrable conjunction.' Such was the origin assigned to them by their enemies the Goths, whom the Huns (prob. abt. 374) invaded with fire and sword. Hermanric, aged sovereign of the Goths, whose dominions reached from the Baltic to the Euxine, roused himself to meet the invaders, but in vain. His successor, Withimir, encountered the Huns in a pitched battle, in which he was slain, and his countrymen utterly routed. These now threw themselves upon the protection of Emperor Valens, who, 376, gave permission to a great number of them to cross the Danube and settle in the countries on the other side as auxiliaries to the Roman arms against further invasion. The Huns now occupied all the territories that had been abandoned by the Goths; and when these, not long afterward, revolted against Valens, the Huns also crossed the Danube, and joined their arms to those of the Goths in hostilities against the Roman empire. In the wars that followed, the Huns were not so conspicuous as the Goths, their former enemies. Indeed, little is heard of the Huns during the remainder of the 4th c. It is supposed, however, that early in the following century

they were joined by fresh hordes of their brethren, and that this encouraged them to press on toward further conquests. In the reign of Theodosius the younger, they had increased so considerably in power, that their sovereign Rugilas, or Roas, was paid an annual tribute to secure the Roman empire from further injury.

Rugilas, dying 434, was succeeded in the sovereignty of the Huns by his nephews Attila (q.v.) and Bleda. With Attila's death, however, 454, the power of the Huns was broken in pieces. Soon afterward, in a critical battle near the river Netad in Pannonia, 30,000 Huns and their confederates were slain. A few feeble sovereigns succeeded him, but there was strife now everywhere among the several nations that had owned the firm sway of Attila, and the Huns especially never regained their power. Many took service in the armies of the Romans; others joined fresh hordes of invaders from the n. and e., aiding them in their repeated attacks on the moribund Roman empire.

HUNT, n. *hŭnt* [AS. *huntian,* to hunt; *hentan,* to pursue: Goth. *hunths,* captivity: Esthon. *hunt,* a wolf (see HOUND)]: the pursuit or chase of wild animals; pursuit; the pack of hounds: V. to chase or pursue wild animals; to follow closely. HUNT'ING, imp.: N. the act or practice of pursuing wild animals for sport or for food. HUNT'ED, pp. HUNT'ER, n. one who hunts; a strong horse trained for the chase. HUNT'RESS, n. *-rĕs,* a woman who hunts. THE HUNT, those who maintain a pack of hounds in any district. TO HUNT DOWN, to bear down by persecution or violence; to pursue closely with a view to seize upon, as a criminal. TO HUNT FROM, to drive out or away. TO HUNT OUT, AFTER, or UP, to seek; to search for. HUNTING-HORN, or BUGLE-HORN, a kind of bugle: in *her.,* a frequent bearing: when adorned with rings, it is said to be *garnished:* if the mouth and strings of the instrument are of different tincture from the horn, this must be named in blazon. HUNTING-BOX, or SEAT, a residence for the convenience of hunting. HUNTS'MAN, n. the servant who attends to the hounds, etc.; a hunter.

HUNT, HELEN. See JACKSON, HELEN FISKE (HUNT).

HUNT, *hŭnt,* JAMES HENRY LEIGH: poet and essayist: 1784, Oct. 19—1859, Aug. 28; b. London; son of an English emigrant who had settled as a lawyer in Philadelphia and had married the daughter of a merchant there. The father being a loyalist had fled to England and taken orders in the church. Hunt was educated at Christ's Hospital, and attracted notice first as a writer of theatrical and literary criticisms for the *Examiner* newspaper, started 1805 by his elder brother John. At the age of 24, he became joint editor and proprietor of the *Examiner.* He was a liberal in politics before liberalism had become fashionable; and for one of his articles reflecting on the obesity of the Prince Regent—'a fat Adonis of fifty,' Hunt had called him—he was

sentenced to pay a fine of £500 and to undergo two years' imprisonment. Hunt was happy enough in his confinement; he hid the prison-bars with flowers, and received visits from Byron, Shelley, and Keats. On his release, he published *The Story of Rimini,* written in prison, which gave him a place among the poets of the day. *Foliage* appeared in 1818, and about the same time he started the *Indicator,* a serial suggested by the *Spectator* and *Tattler.* In 1828, he published *Lord Byron and his Contemporaries,* the record of a brief and not very pleasant companionship in Italy with his lordship, which gave great offense to Byron's friends. In the same year he started *The Companion,* sequel to *The Indicator,* both of which were republished as one book 1834. In 1833, he published a collected edition of his poetical works. In 1834, he started the *London Journal,* which he edited for two years. His principal works, besides those above mentioned, are—*Captain Sword and Captain Pen* (1835); *Legend of Florence* (1840); *The Seer,* similar to *The Indicator; The Palfrey* (1842); *Sir Ralph Esher,* novel (1844); *Imagination and Fancy* (1844); *Wit and Humor* (1846); *Stories of the Italian Poets, with Lives* (1846); *Men, Women, and Books* (1847); *A Jar of Honey from Mount Hybla* (1848); *Autobiography* (1850); *The Religion of the Heart* (1853); and *The Old Court Suburb* (1855). In 1847 he received from the crown a pension of £200. He died at Highgate. A selection from his *Letters and Correspondence* was published by his son, Thornton Hunt, 1862.

Hunt's reputation rests on his poems and essays. *The Story of Rimini* is, on the whole, perhaps the finest narrative which has appeared since Dryden, and his *Palfrey* is delightful from its good spirits and bright sunny glimpses of landscape and character. As an essayist, he is always cheerful and fanciful, and he looks determinedly at the bright side of things. His style is unhackneyed, and he had a refined critical perception, and a high poetic taste; though his work is sometimes disfigured by lapses into flippancy. Among his poems are several translations, which are among the best things of the kind.

HUNT, Mary Hannah: temperance reformer; b. S. Canaan, Conn., 1830, July 4. Graduated from Patapsco Institute, Baltimore; and was teacher of chemistry and physiology there. She is best known for the leading part she has taken in drafting laws and conducting the agitation for compulsory scientific temperance education in the schools, which is now in force in the states of the United States and many of the provinces of Canada. She is superintendent of the Dept. of Scientific Temperance Instruction for the W. C. T. U., director of the Bureau on Scientific Temperance Investigation, is editor of *School Physiology,* and has published a number of textbooks on temperance physiology.

HUNT, RICHARD MORRIS: architect: b. Brattleborough, Vt., 1828, Oct. 31; d. 1895, July 31. He began studying architecture in the United States, went to Europe 1843, entered the Paris School of Fine Arts, assisted Lefuel in erecting the buildings connecting the Tuileries with the Louvre, visited the art centres of the old world, returned to the United States 1855, and has since followed his profession. His chief works are the extension of the U. S. capitol; the Lenox library, Presb. hospital, *Tribune* building, Central Park entrances, and William K. Vanderbilt's house in New York; the Vanderbilt mausoleum on Staten Island; Yorktown monument; pedestal of Bartholdi's Statue of Liberty; theol. library and Marquand chapel, Princeton; divinity college and soc. buildings at Yale College; and numerous residences. He was appointed a chevalier of the Legion of Honor by the French govt. 1884.

HUNT, THOMAS STERRY, PH.D., F.R.S., LL.D.: 1826, Sept. 5—1892, Feb. 12; b. Norwich, Conn.: scientist. He studied chemistry, became assistant to Prof. Silliman in the Yale College laboratory 1845, was chemist and mineralogist to the geological survey of Canada 1847-72, prof. of chemistry in Laval Univ. 1856-62, and in McGill Univ. 1862-68, prof. of geology in the Mass. Institute of Technology 1872-78, and since 1878 has applied himself to technical authorship. He has published a series of papers on theoretical chemistry in the *American Journal of Science* (1848-51); *The Chemistry of the Earth* (Smithsonian pub. 1869); *A Century's Progress in Chemical Theory* (1874); *Chemical and Geological Essays* (1874); *Azoic Rocks* (1878); *Mineral Physiology and Physiography* (1886); *A New Basis for Chemistry* (1887); and *Mineralogy according to a Natural System* (1888); besides numerous reports and special papers. He was pres. of the American Assoc. for the Adv. of Science 1871, the American Institute of Mining Engineers 1877, the American Chemical Soc. 1880, and the Royal Soc. of Canada 1884; became a F.R.S. 1859; and received the degree LL.D. from McGill Univ. 1857, and Cambridge Univ., England, 1881, and SC.D. from Laval Univ. 1858.

HUNT, WILLIAM HENRY: eminent painter in water-colors: 1790, Mar. 28—1864, Feb. 10; b. London. He ranks very high in his profession; no less an authority than Mr. Ruskin pronouncing him among the greatest colorists of the English school. His subjects are very simple—*Peaches and Grapes, Old Pollard, Basket of Plums, Bees, Wild Flowers, Trampers at Home, A Farmhouse Beauty, Fast Asleep,* etc.

HUNT, WILLIAM HENRY: an American jurist; b. in New Orleans, La., 1857, Nov. 5; was educated at Yale University; was collector of customs in Montana and Idaho, 1881-85; attorney-general of Montana, 1884; member State legislature, 1889; judge of the district

court of Montana, 1889-94, and of the supreme court, 1894-1900; and became governor of Porto Rico, 1901.

HUNT, WILLIAM HOLMAN: painter; b. London 1827. He exhibited his first picture, *Hark!* 1846. During the next few years his reputation steadily advanced; but while the young artist was winning fame, he was becoming more and more dissatisfied with the principles and practices that ruled his art; and with Millais, Rosetti, and other young painters who shared his convictions, he commenced a new style of treatment, known as the *Pre-Raphaelite.* This term, originated by Hunt and his friends, was employed by them to indicate their predilection for the painters who lived before Raphael, such as Giotto and Fra Angelico, but did not at all imply that they meant to take the productions of these masters as technical models. The truthfulness and earnest simplicity of the fathers of Italian art were the qualities which they admired. The first of Hunt's works that showed the new influence was his *Converted British Family Sheltering a Christian Missionary from the Persecution of the Druids* (1850). He afterward produced, among others, *Valentine Rescuing Sylvia from Proteus, The Hireling Shepherd, Our English Coasts, London Bridge on the Night of the Marriage of the Prince of Wales, The After-Glow, The Festival of St. Swithin, The Awakened Conscience, The Light of the World, The Scape-Goat, Christ Disputing with the Doctors in the Temple,* and the *Shadow of Death* (1873).

HUNT, WILLIAM MORRIS: 1824, Mar. 31—1879, Sep. 8; b. Brattleborough, Vt.: artist. He took a partial course at Harvard College, entered the Royal Acad. at Düsseldorf to study sculpture 1846, abandoned that line of art for painting within a few months, and studied with Couture, Millet, and Barbizan in Paris, and returning to the United States established himself as artist and teacher in Boston 1855. Besides many portraits he painted *The Prodigal Son, The Drummer Boy, The Fortune Teller, The Choristers, Girl at the Fountain, Morning Star, Marguerita, Priscilla, Bugle-Call, The Bathers, Gloucester Harbor, Plowing, The Flight of Night,* and *The Discoverer.*

HUNTER, *hŭnt'ėr,* DAVID: 1802, July 21—1886, Feb. 2; b. Washington, D. C.: soldier. He graduated at the U. S. Milit. Acad. 1822; was promoted 1st lieut. 1828, and capt. of dragoons 1833; engaged in business 1836-42; re-entered the army and served through the Mexican war; was appointed col. 6th U. S. cav. 1861, May 14, and brig.-gen. of vols. May 17; commanded a div. and was wounded at Bull Run July 21; promoted maj.-gen. of vols. 1861, Aug. 13; succeeded Gen. Fremont in command of the w. dept. Nov. 21; contributed largely to the Union success at Fort Donelson; was transferred to the s. dept. 1862, Mar.; declared slavery abolished in his dept. Apr. 12, which order (as being unauthorized) was annulled by

President Lincoln Apr. 22; raised the first regt. of colored troops in the Union service; was president of the commission that tried the Lincoln conspirators 1865; brevetted maj.-gen. U.S.A. 1865; and retired for age 1866, July 31.

HUNTER, JOHN: greatest name in the combined character of physiologist and surgeon that the annals of medicine can furnish: 1728, Feb. 13—1793, Oct. 16; b. Long Calderwood, Lanarkshire, Scotland; youngest of ten children. One of his brothers, William, claims a separate notice. One of his sisters, Dorothea, was married to Dr. James Baillie, prof. of divinity in the Univ. of Glasgow, and was the mother of Matthew Baillie (q.v.) and Joanna Baillie (q.v.). The fact that the father died when Hunter was only ten years of age, and the probability that he was over-indulged by his mother, explain why, at the age of 20 he could simply read and write, and was ignorant of every language except his own. The fame of his brother William's success as an anatomical lecturer, made Hunter desirous of entering the same profession, and he accordingly applied for and obtained the situation of assistant in the dissecting-room. His progress in anatomy and surgery was so rapid, that in the second session he was able to undertake the directing of the pupils in their dissections. He studied surgery under Cheselden (celebrated lithotomist), at Chelsea Hospital, during the summer months of 1749-50; and subsequently under Pott.

In 1753, Hunter entered as a gentleman commoner at St. Mary's Hall, Oxford; but finally deciding on confining himself to the practice of surgery, he entered St. George's Hospital as surgeon's-pupil 1754, and two years afterward served the office of house-surgeon. In 1754 Hunter became a partner with his brother in the anatomical school. After ten years' hard work in the dissecting-room, his health began to give way, and in 1759 he was strongly advised to seek a more southerly climate. With this view he applied for an appointment in the army, was immediately made staff-surgeon, and sent out to Belleisle, and afterward to the Peninsula; but 1763, peace having been proclaimed, he returned home, permanently settled in London, and with nothing but his half-pay and his own talents to support him started as a pure surgeon. For a while he had not a great practice and consequently devoted much time and money to comparative anatomy. He was in the habit of purchasing the bodies of animals that died in the Tower, and in travelling menageries; and in order conveniently to carry on his anatomical and physiological inquiries, he purchased a piece of ground at Earl's Court, Brompton, where he built a small house, in which he made most of his researches. In 1767, he was elected a fellow of the Royal Soc., and in the following year was appointed surgeon to St. George's Hospital. This appointment led to an increase of his practice, and enabled him to take pupils, each of whom paid him 500

guineas. Jenner (q.v.) was one of the earliest of these, and always spoke of his old master in terms of regard and affection. In 1771, he married Miss Home, sister of Mr. (afterward Sir Everard) Home. Mrs. Hunter had a taste for music, and was the author of several popular songs: *My Mother Bids Me Bind My Hair* is one of hers, and was written to an air of Haydn's. Hunter's practice at this time was increasing rapidly but his income never reached £1,000 a year until 1774. In 1773, he had the first attack of a disease (*angina pectoris*) which ultimately proved fatal. In 1776, he was appointed surgeon-extraordinary to the king.

In 1783, he determined to build a museum. The building, which was completed 1785, consisted of an upper room for the reception of his collection, 52 ft. long by 28 wide, under which were a lecture-room, and another room which became the place of meeting of the Lyceum Medicum, a society established by Hunter and Fordyce. It was in Dec. of that year that he planned and carried into execution his famous operation for the cure of aneurism —that of simply tying the artery at a distance from the tumor, and between it and the heart, thus introducing into surgery an improvement which has been more fruitful in important results than any since Ambrose Pare's application of ligatures to divided arteries. In 1786, Hunter was appointed deputy-surgeon-gen. to the army; in 1787 he re-received the Copley medal from the Royal Society. He was now universally acknowledged, by all the younger surgeons, as the head of the profession; but most of his contemporaries looked on him as little better than an innovator and an enthusiast. He died of spasmodic heart attack, and was buried in the church of St. Martin's-in-the-Fields, whence his remains were removed, 1860, to Westminster Abbey, where a suitable tablet to his memory has been erected by the Council of the Royal College of Surgeons.

Some idea may be formed of Hunter's extreme diligence, by the fact that his museum contained at the time of his death 10,563 specimens and preparations illustrative of human and comparative anatomy, physiology, pathology, and natural history. He died in comparative poverty, and his collection was purchased, two years after his death, by government for £15,000, and was presented to the Royal College of Surgeons, by whom it has been much enlarged.

In addition to numerous papers contributed to the *Transactions* of the Royal and other learned societies, he published the following independent works: *A Treatise on the Natural History of the Human Teeth* (part i. 1771; part ii. 1778); *A Treatise on the Vencreal Disease* (1786); *Observations on Certain Parts of the Animal Economy* (1786); and *A Treatise on the Blood, Inflammation and Gunshot Wounds* (1794). Mr. Palmer, with the literary assistance of several eminent surgical

friends, published an excellent ed. of *The Works of John Hunter, F.R.S., with Notes*, in 4 vols., 1835. To this is prefixed *The Life of John Hunter, F.R.S.*, by Drewry Otley, from which most of the materials of this sketch have been taken.

HUNTER, WILLIAM, M.D.: 1718, May 23—1783, Mar. 30; b. Long Calderwood, parish of Kilbride, Lanarkshire, Scotland; elder bro. of John Hunter. After studying for five sessions in the Univ. of Glasgow, with a view to the profession of the ministry, he turned to that of medicine. He passed the winter session 1740-1 in Edinburgh, and in the summer of 1741 went to London. Hunter was then entered as a surgeon's pupil of St. George's Hospital, and as a dissecting pupil of Dr. Frank Nicholls, teacher of anatomy. To teach anatomy was now the object of his ambition. In 1746 an opportunity was presented to him, through an appointment to teach a society of naval surgeons. In 1747, Hunter was admitted a member of the Corporation of Surgeons. In his early career, he practiced both surgery and midwifery, but he gradually confined himself to the latter. He was appointed one of the surgeons-accoucheur to the Middlesex Hospital 1748, and to the British Lying-in Hospital 1749.

In 1762, Hunter was consulted by Queen Charlotte, and two years afterward was appointed physician-extraordinary to her majesty. In 1767, Hunter was elected a fellow of the Royal Soc., and in the following year was appointed prof. of anatomy to the Royal Acad. In 1770 he removed to Great Windmill Street, where he had built a house, in connection with a roomy amphitheatre for lectures, a dissecting-room, and a magnificent room for his museum, which consisted of anatomical preparations executed by himself and his pupils, purchases from other museums, also minerals, shells, and other objects of natural history, with a very rare cabinet of ancient medals and coins.

An estrangement which took place between Hunter and his brother John continued till Hunter was on his deathbed, when his brother requested that he might be admitted to see him. This was acceded to, and he continued to visit him daily, and to afford him professional assistance, until his death. Together with the bulk of his fortune, Hunter left his museum to Dr. Baillie for a period of 30 years, after which it was to be transferred to the Univ. of Glasgow, to which institution he bequeathed £8,000 for its maintenance and increase.

Hunter excelled as a lecturer in clearness of arrangement, aptness of illustration, and elegance of diction. 'He was, perhaps, the best teacher of anatomy that ever lived.' He published several important contributions to medicine, of which the most important appeared in its perfect form after his death, *Anatomical Description of the Human Gravid Uterus and its Contents.*

HUNTER RIVER: in New South Wales, entering the Pacific 75 m. n. of Sydney.

HUNT'ER'S MOON: the full moon next following the harvest-moon, which is itself the full moon nearest the autumnal equinox. At the period of the H. M., the full moon, necessarily opposite the sun, is at a point in the ecliptic near enough to the sign Aries to make an extremely small angle with the e. horizon when rising, though larger than at the time of the harvest-moon. It therefore rises for several consecutive nights at nearly the same hour, so that there is an unusual proportion of moonlight evening. The October moon rises three successive evenings after the full with an average difference of only 37 minutes. The phenomenon is the more striking the higher the latitude: it disappears entirely in the tropics.

HUNT'ER'S POINT: see LONG ISLAND CITY.

HUNTINGDON: borough, cap. of H. co., Pa.; on the Juniata river, and the Pennsylvania railroad; about 200 m. w. of Philadelphia. It is in a fertile agricultural region, with valuable mineral resources and extensive forests. The chief manufactures are machinery, boilers, radiators, stoves, sewer-pipe, flour, furniture, knit goods, etc. H. contains the State Industrial School, Juniata College (German Bapt. Breth.), public schools, churches, banks, etc. It was first settled 1760 and incorporated 1796, the government being vested in a chief burgess, who holds office three years, and a council. Pop. (1910) 6,861.

HUNTINGDON, *hŭnt'ĭng-don:* market-town and parliamentary and municipal borough of England, cap. of the county H.; on the left bank of the Ouse. H. is connected with its suburb Godmanchester by a bridge over the Ouse. It has connection with the Great Northern and Great Eastern railways. There are 3 established churches, 4 dissenting chapels, and numerous schools, one of which is the Grammar-school (recently renewed), with two exhibitions for Cambridge Univ. There are large brick-works, two breweries, and an iron-foundry. The house of Oliver Cromwell is of historical interest. Pop. of parl. bor. (1871), 6,606; of mun. bor. 4,243; (1901) abt. 7,500 and 5,000.

HUNT'INGDON, SELINA, Countess of: 1707, Aug. 24 —1791, June 17; b. at Stanton-Harold, a mansion near Ashby-de-la-Zouch, Leicestershire: second of the three daughters and co-heiresses of Washington Shirley, second Earl Ferrars. She married 1728, Theophilus, 9th Earl of Huntingdon, and became a widow 1746, Oct. Adopting the principles of the Calvinistic Methodists, founded by the famous George Whitefield, she made that eminent preacher one of her chaplains, and assumed a leadership among his followers, who came to be known as 'The Countess of Huntingdon's Connection.' On Whitefield's death 1770, she was appointed by his will sole proprietrix of all his possessions in the province of Georgia, on which she immediately set about organizing a mission to N. America. Her labors increased with her years.

For the education of ministers, she established and maintained a college at Trevecca, in Wales, removed, 1782, to Cheshunt, Herts; and built, or became possessed of, numerous chapels in different parts of the country, the principal one being at Bath. She likewise expended large sums in the support of young men trained to itinerant preaching, as well as in private charity. But with all her excellences, she was not indisposed to play the part of a female pope, and had a passion for carrying her point. By her will, 1790, Jan. 11, she created a trust, bequeathing her chapels to four persons, of whom Lady Anne Erskine, daughter of the Earl of Buchan, was one, for their care and management after her death, when the number amounted to 64. Most of them have become, in doctrine and practice, identical with the Congregational body. There are now about 40 chapels belonging to this connection in England and Wales.

HUNTINGDONSHIRE, *hŭnt'ing-don-shĕr*, or HUNTS, *hŭnts:* small inland county of England: bounded e. by Cambridgeshire, s. by Bedfordshire, and w. and n. by the county of Northampton; 229,515 acres, almost the whole of which is arable or in pasture. Pop. 57,772. It is watered chiefly by the Ouse, which flows n.e. through the s. part of the county; and by the Nene, which skirts its n. boundary. In the s. districts the surface is diversified by low hills; the n. portion of H., however, is included in the great fen-country. The soil is various; clay, however, predominates generally. Grain, with beans, rape, and clover are the chief crops. The county return two members to the imperial parliament.

The county of H. was traversed by two Roman roads, and Roman remains, as coins, pottery, etc., have been found.

HUNTINGTON: township, Fairfield co., Conn. The Housatonic river bounds it on the e. and n.e. It contains a borough named Huntington and a borough named Shelton, the former being 13 m. w. of New Haven. H. has extensive paper-mills, besides manufactories of silverware, carriage joints, brackets, hooks and eyes, etc., and several churches and schools. Pop. Huntington town, including Shelton (not separately returned), (1880) 7,892; (1890) 10,131; (1900) 5,572; (1910) 6,545.

HUNTINGTON: city, cap. of Cabell co., W. Va.: on the Ohio river, just below the confluence of the Guyandotte river, and on the Chesapeake and Ohio, the Ohio river and the Guyandotte Valley railroads; 52 m. w. of Charleston. The city also has steamer communication with the important river points. It is an important commercial and industrial centre, the chief establishments being the car shops of C. & O. railroad, planing mills, foundries and machine shops, brewery, meat-packhouse, steel plant, and manufactures of glass, paint, bricks, ice, stoves, woodwork, etc. The city contains the Marshall College (the State Normal School), the Douglas High School, for colored students, a Carnegie Library, the West Va. Asylum for Incurables, 2 banks, churches, public schools, etc. It also has electric lights

and street railways. It was founded and incorporated 1871, received a city charter 1895 (revised 1901), and is governed by a mayor, elected for two years, and a unicameral council. Pop. (1900) 11,923.

HUNTINGTON: town in Suffolk co., Long Island, N. Y.; on Long Island Sound and on the Long Island railroad, about 36 m. e. from New York. It is a favorite residential suburb but has some manufactures, the chief of which are pottery and brick; market gardening is also carried on to some extent and the dairy products are valuable. H. has a public library of over 3,500 vols., and upon the spot where Nathan Hale was captured a boulder, a shaft, and a drinking fountain have been erected. It was first settled in 1653, the first deed of land being given on April 15 of that year, and as originally laid out covered 150 sq. m. and included the village of Babylon and other places. The government is administered by biennial town meetings. Pop. (1900) 9,483.

HUNTINGTON: city, cap. of Huntington co., Ind.; on the Little river and the Wabash and Chicago and Erie railroads; about 20 m. s.w. of Fort Wayne. The city is the commercial centre of the upper Wabash valley, the trade comprising manufactures, coal and lime, and agricultural products, the chief manufactures are bicycles, plows, lime, cement, barrels, boots and shoes, pianos, etc., and there are also railroad shops and woodworking factories. H. contains the United Brethren College, a library of about 12,000 vols., churches, schools, banks, etc. It was first settled in 1834, was incorporated as a town in 1848 and as a city in 1873. The government consists of a mayor, elected biennially, and a city council. The city owns the electric-light plant and water-works. Pop. (1900) 9,491.

HUNTINGTON, Collis Potter: railroad builder and pres.: b. Harwinton, Litchfield co., Conn., 1821, Oct. 22; d. Lake Raquette, N. Y., 1900, Aug. 13. He had only a common-school education, obtained his time when 14 years of age, and afterward supported himself, worked for some time in a store, travelled for several years in the w. and s., and then engaged in mercantile business with a brother at Oneonta, N. Y. He started for Cal. 1849, Mar., spent some months on the Isthmus, after which he went to Sacramento and commenced business in a tent, opened a large hardware store, and entered into partnership with Mark Hopkins. He planned 1860 a transcontinental railroad; with Leland Stanford, Charles Crocker, and Mark Hopkins, paid the expenses of the preliminary survey across the Sierra Nevada range; and on the organization of the Central Pacific railroad company was made vice-pres. and practical manager. By extensions and purchases of existing roads, he secured control of a line from Newport News, Va., to San Francisco. In 1890, Apr., he was elected pres. of the South Pacific system.

HUNTINGTON, *hŭnt'ĭng-ton*, Daniel: artist: b. New York, 1816, Oct. 14; d. there 1906, Apr. 18. He was edu-

cated at Hamilton College, began studying painting with Samuel F. B. Morse 1835, spent 1836–39 sketching in the Hudson Highlands, studied and painted figure-pieces in Rome, returned to New York and painted portraits and made drawings for book illustrations till his eye-sight failed, spent 1844–46 in Europe, and afterwards was engaged in portrait and historical painting in New York. He became an associate of the National Acad. of Design 1839, academician 1840, and pres. 1862–69 and 1877. His works include: *Early Christian Prisoners; Christiana and her Children; Queen Mary Signing the Death Warrant of Lady Jane Grey; Henry VIII. and Catharine Parr; Lady Jane Grey and Feckenham in the Tower; The Republican Court in the Time of Washington; The Narrows, Lake George; Clement VII. and Charles V. at Bologna;* and *Goldsmith's Daughter.*

HUNTINGTON, Frederic Dan, D.D., LL.D.: Prot. Episc. Bishop; b. Hadley, Mass., 1819, May 28; d. there 1904, July 11. He graduated at Amherst College 1839, and the Cambridge Divinity School 1842; was pastor of the South Congl. Church (Unit.), Boston, 1842–55; Plummer prof. of Christian morals, and preacher in Harvard College 1855–60; ordained deacon in the Prot. Episc. Church 1860, Sep. 12, and priest 1861, Mar. 19; organized and was rector of Emmanuel parish, Boston, 1860–69; and was consecrated first Prot. Episc. bp. of Central New York 1869, Apr. 8. He was a founder and for many years editor of the *Church Monthly*, published a large number of sermons and addresses, wrote the *Pastoral Letter* for the gen. convention of 1883, and received the degree D.D. from Amherst College 1856 and LL.D. from the same 1887.

HUNT'INGTON, Jedidiah: 1743, Aug. 4—1818, Sep. 25; b. Norwich, Conn.; soldier. He graduated at Harvard College 1763, joined his father in commercial business, raised a regt. for the army at Cambridge 1775, was at the repulse of the British at Danbury 1776, Apr.; appointed brig.-gen. 1777, May 12; served in the courts that tried Gen. Charles Lee and examined John André, brevetted maj.-gen. after the war, and was collector of customs at New London 1789–1815.

HUNT'INGTON, Samuel, LL.D: 1731, July 3–1796; Jan. 5; b. Windham, Conn.; signer of the Declaration of Independence. He received a limited education, learned the cooper's trade, studied law, was admitted to the bar 1758, was member of the Conn. gen. assembly 1764, appointed king's attor. 1765, member of congress 1776-83 and its pres. 1779–81, judge of Conn. supreme court 1774-84, chief justice 1784, lieut.gov. 1785, and gov. 1786-89. He received the degree LL.D. from Dartmouth College 1785 and Yale College 1787.

HUNT'INGTON, William Reed, D.D.: Prot. Episc. clergyman; b. Lowell, Mass., Sep. 20, 1838. He graduated at Harvard College 1859; was acting prof. of chemistry there 1859–60; took orders in the Prot. Episc. Church 1860; was asst. to his relative, Frederic Dan H., D.D., in Emmanuel Church, Boston, 1861-62; rector of

All Saints', Worcester, Mass., 1862–83; and succeeded Asst. Bish. Henry C. Potter as rector of Grace Church, New York, 1883. He received the degree D.D. from Columbia College 1873. He has written: *The Church Idea* (1870); *Conditional Immortality* (1878); *Popular Misconceptions of the Episcipal Church* (1891); *The Causes of the Soul* (1891); *The Peace of the Church* (1891); *Short History of the Book of Common Prayer* (1893); *The Spiritual House* (1895); *A National Church* (1898); *Psyche, a Study of the Soul* (1899); *Four Key-words of Religion* (1899); *Sonnets and a Dream* (1899); etc.

HUNTLY, *hŭnt'lĭ:* small burgh or barony and market-town of Scotland, in the n.w. of Aberdeenshire, at the junction of the Bogie and the Deveron, 20 m. s.s.w. of Banff. In the vicinity is the ruin of H. Castle. Pop. (1871) 3,570; (1881) 3,519; (1900) abt. 4,500.

HUNTSVILLE, *hŭnts'vĭl:* city, cap. Madison co., Ala.; on the Nashville, Chattanooga and St. Louis and the Southern railroads; 96 m. n. of Birmingham, 97 m. w. of Chattanooga and 125 m. s. of Nashville. It is in an exceptionally fertile agricultural and fruit, cotton, and stock-raising country, making it the most important commercial centre of the Tennessee Valley. Its largest industry is the manufacture of cotton, there being 9 cotton mills with over 200,000 spindles and about 4,300 looms, and an annual product valued at $4,775,000. There are also cotton-seed-oil mills, foundries and machine shops, saw and planing mills, brick works, hoop and heading factory, spoke and handle factories, fibre factory, gas and electric plants, etc. The city contains a number of private schools and an excellent public school system; four m. n. of the city is the Alabama Agricultural and Mechanical College for negroes. There are also numerous churches, banks, public buildings, electric car lines, a paid fire department and the city owns and operates the waterworks which are supplied from a magnificent spring of pure water with a capacity of 2,400,000 gallons. H. was first settled in 1805 by John Hunt, a Virginian, who, having built his cabin at the 'Big Spring' returned to Tennessee and in the following year brought his entire family. In 1811 the town was incorporated by the territorial legislature as 'Huntsville.' On 1819, July 5, the first State Constitutional Convention met here and framed the constitution. The first State legislature sat here in 1820, August, and the city was also the first capital of the State. The city government, under the charter of 1897, is vested in a mayor, elected biennially, and a board of 8 aldermen, who have control over all city affairs, including the waterworks. Pop. (1910) 7,611.

HUNYADY, *hön'yŏd-ĭ*, JANOS (Eng. JOHN): governor of Hungary, one of the greatest captains of his age; b. near the close of the 14th c.: d. abt. 1448. H.'s origin is wrapped in mystery, the most accredited legend being that he was son of Emperor Sigismund by a Wallachian

lady. Hunyady and his descendants had in their escutcheon a raven—*corvus*—hence the designation Corvinus. We find Hunyady as Ban of a province s. of the Danube, distinguishing himself against the Turks, who at that time were the terror of the whole of Christendom. During 1437-56, Hunyady was the shield of Hungary, not only against external foes, but also against the lawless attempts of the nobles. Such was the renown of Hunyady's arms that, after the campaign of 1444, the Turks were glad to obtain an armistice of ten years. The vacillating Vladislas I, allowed himself to be induced by the papal legate, Julian Cæsarini, to break the peace that he had sworn to keep. Hunyady was defeated in the bloody battle of Várna, 1444; the king perished in the fight, as also the cardinal legate; Hunyady was captured during his flight by the voivod of Wallachia; but on a declaration that the whole of Hungary would rise to deliver the noble prisoner, was safely escorted to the frontier, and there set free. During the minority of Ladislaus V. (son of Vladislas I.), Hunyady was elected by the nation gov. of Hungary. The battle of Rigómagö (1447), one of the bloodiest ever fought, was lost through the treason of the voivod of Wallachia; Hunyady had once more to go through a short captivity. But the most splendid of his deeds was the storming of Belgrade, where the monk, John Capistran, carrying the holy cross, raised the enthusiasm of the Christian warriors to such a height, that a most complete victory brought that fortress again into the possession of the Hungarians. Shortly afterward dysentery broke out in the camp, and Hunyady, the great Christian hero, after a short illness, fell a victim to the disease.

HUPEH, *hô-pā:* one of the central provinces of China, reputed the most fertile; 70,450 sq. m. The cap. is Wuchang. The great river Yangtse, recently opened to foreign commerce, flows through the s. point of the province, where it receives tributaries from various lakes on either side, nearly doubling its volume of water. Pop. 27,370,098.

HUPPAH: the wedding canopy universally employed among Jews, and symbolic of the room or home. It was made in rabbinical times of purple cloth adorned with jewels, or like a bower of roses and myrtle. In later ages it became a portable canopy, borne on four poles which were held by guests, under which the marriage ceremony was performed. Often the scene of the wedding was in the open space in front of the synagogue. In the United States the formal huppah is abandoned in reform congregations, a bell of flowers being suspended instead over the bride and groom. Some of the wedding canopies are of elaborate embroidered designs and held in high honor.

HURA, *hū'ra:* genus of plants of nat. ord. *Euphorbiaceæ. H. crepitans,* a native of the W. Indies and trop-

ical America, is a tree abounding in a very acrid milky juice; with stalked, heart-shaped, acuminate, leathery leaves. The fruit is a woody capsule, of the size of a large apple, very much flattened, formed of 12-15 *cocci*, each containing a large seed, surrounding a common axis, which separate with great elastic force. Before the use of blotting paper became general, the capsule was generally used in the W. Indies as a sand-box—whence the tree is called SAND-BOX TREE—for powdering letters with fine sand; but it was found necessary to bind it with a hoop of iron, as even after being used for years it would sometimes burst with a report like that of a pistol. The seeds are a violent drastic purgative.

HURD, *hėrd*, RICHARD, D.D.: 1720, Jan. 13—1808, May 28; b. Congreve, Staffordshire: English prelate. He studied at Cambridge Univ., of which he became a fellow 1742. In 1749 appeared his first notable production, *Commentary on Horace's Ars Poetica.* In 1750, on Warburton's recommendation, he was appointed one of the Whitehall preachers. He afterward became Bishop of Litchfield and Coventry, and 1783 declined the archbishopric of Canterbury. His principal works are—*Dialogues on Sincerity, Retirement, The Golden Age of Elizabeth and the Constitution of the English Government* (1759); *Letters on Chivalry and Romance* (1762); and *An Introduction to the Study of the Prophecies Concerning the Christian Church* (1772). Hallam says of Hurd, that he 'has perhaps the merit of being the first who, in this country, aimed at philosophical criticism.'

HURDLE, n. *hėr'dl* [Dut. *horde*, a fence of branches or osiers: Ger. *hürde*, a frame of rods or wicker-work: Icel. *hurd*, a wicker-gate: Swiss, *hurd*, a pole: F. *hard*, a withe]: a framework of intertwined twigs or the smaller branches of trees; a crate; the rough framework on which criminals were dragged to execution: v. to enclose or guard with hurdles. HURDLING, imp. *hėrd'ling*. HURDLED, pp. *hėr'dld*. HURDLES, n. plu. *hėr'dlz*, frames for fencing, etc. In military affairs, straight flat rectangles of strong wicker-work, about 6 ft. long, and 2 ft. 9 inches high. They are useful in many ways, both in military and civil life, either as fencing, as barriers; or in fortification, in the construction of *hurdle-batteries*, which were the invention of Sir William Congreve, who devised them as the speediest means of throwing up earthworks: three hurdles are fastened at their ends in the form of a triangle, and the central space is filled in a short time with earth. These triangles can be constructed to any ground-plan, and with their aid, a body of soldiers can entrench themselves in a few minutes. The hurdle is composed of wattles interwoven (as shown in the diagram) around stakes or pickets, the latter during the manufacture being fixed upright and firmly in the ground.

HURDS, or HARDS, n. plu. *hėrdz* [AS. *heordas*, the refuse of tow]: the coarse part of flax or hemp; any waste tow or oakum.

HURDWAR, *hėrd-wâr'* (rather HARDWÂR, i.e. *Haridwára*, Vishnu's gate): perhaps the most famous spot on the Ganges, on the right or w. bank of the river at the point where it emerges from the sub-Himalaya into the plains of Hindustan. It is 1,024 ft. above sea-level, in Saharumpur, N.W. Provinces. From its position on the sacred stream, it attracts immense numbers of pilgrims for ablution. The orthodox season comprises the end of March and the beginning of April—a great fair at the same time engrafting commerce on religion. In ordinary years, the attendance is about 100,000; but every twelfth year (as in 1879, 91, etc.), a peculiarly sacred feast takes place, attended by perhaps 300,000 (formerly by as many as 2,000,000). Pop. 5,000.

HURDYGURDY, n. *hėr'dĭ'gėr'dĭ* [imitative of its grinding rough tones: Scot. *hur*, to snarl; *gurr*, to growl]: very old musical stringed instrument, which, under the name Leyer, or Baurenleyer, spread from its native country, Germany, over a great part of Europe. The hurdygurdy consists of a flat, oval sounding-board, over which strings are stretched, with a back or bottom of the same size and shape. These are bound together by deep sides, or ribs. On one side are 10 to 12 finger-keys, for shortening the sounding lengths of the strings. There are four strings, of gut, put into a state of vibration by being rubbed by the edge of a small wooden wheel charged with rosin and turned by a handle. Two of the strings are tuned in unison as a key-note, or one of them a fifth above; they are placed out of reach of the keys, and form a sort of drone-bass. The other two strings are acted on by the keys, and produce a diatonic scale of 10 to 12 notes. The hurdygurdy is suited only to simple music, and was used for such as had many repetitions. Its simplicity and cheapness made it formerly a favorite among the peasantry of Europe. The name is now often used of the barrel-organ (q.v.), or of a kind of mechanical piano.

HURKARU, n. *hŭr'kâr'ô:* in the *East Indies*, a running footman; a messenger; a Calcutta daily paper so called.

HURL, v. *hėrl* [Sw. *hurra*, to whirl: Dan. *hurre*, to hum or buzz: Swiss, *hurrli*, a humming-top (see WHIRL)]: to drive through the air with a whirring noise; to throw with violence; to drive with great force; to whirl: n. the act of hurling; a tumult. HURL'ING, imp. HURLED, pp. *hėrld*. HURL'ER, n. *-ėr*, one who.—SYN. of 'hurl, v.': to drive; throw; cast; toss.

HURL, v. *hėrl* [F. *hurler*, to howl, to shriek]: to howl; to shriek, as 'to hurl defiance'; to utter with vehemence; to scream. HURL'ING, imp. HURLED, pp. *hėrld*. *Note.*—

HURL, in this sense, is uniformly placed in dictionaries under HURL 1, 'to utter, throw, or drive with vehemence': surely the sense *howl* or *shriek* comports much more effectively with such expressions, 'hurling defiance'='howling or shrieking defiance,' 'he hurls out vows'='he *screams* out vows'—see Latham, under HURL. Without doubt, however, the senses of HURLS 1 and 2, expressing nearly identical ideas, have become confused, for we have the analogous expressions, 'to cast reproach' and 'to throw taunts.'

HURL, n. *hėrl* [Scot., connected with WHIRL, which see, and HURL 1]: in *Scot.*, a drive in a conveyance or cart: v. to drive or drag a small hand-conveyance; to be driven in a conveyance. HURLEY, n. *hėr'lĩ*, a small two-wheeled conveyance that can be driven with the hands; a hand-cart.

HURLY, n. *hėr'lĩ* [imitative of the sound of bodies *whirring* or moving rapidly through the air]: in *OE.*, bustle; tumult; commotion. HURLY-BURLY, n. *-bėr'lĩ:* great commotion: ADJ. creating confusion; tumultuous, see HULLABALOO.

HURON, *hū'ron*, LAKE: third in size of the five 'great lakes' of N. America; lat. 43° 5′—46° 15′ n., long. 79° 30′—84° 50′ w.; between Lake Superior on the n.w., Lake Michigan on the n.w. and w., and lakes Erie and Ontario on the s. and s.e.; length n. to s. 260 m., on the s.w. coast 260 m.; breadth (greatest) e. to w. 160 m., but excluding Georgian Bay on the n.e., only 90 m.; circumference 1,100 m.; area 21,000 sq. m.; surface elevation 19 ft. above Lake Erie, 352 ft. above Lake Ontario, 578 ft. above sea-level; depth, greatest, about 1,800 ft., average 1,000. The water, coming from numerous streams, is clear and cold, and the navigation season is between May 1 and Dec. 1. The boundary line between the United States and Canada extends 225 m. along the middle of the main body, then through the middle passage between Lesser Manitou and Drummond's Islands, and curves to the n. and w. 25 m. to the entrance of St. Mary's river. The lake receives the waters of Lake Superior by St. Mary's river, those of Lake Michigan by the Straits of Michilimackinac, of Lake Nipissing on the n. by Francis river, and of Lake Simcoe on the e. by Severn river, and discharges its own waters by the St. Clair river. Its bays and harbors are more numerous than those of any other of the 'great lakes.' The most important are Saginaw Bay, extending into Michigan; Georgian Bay, s.e. of the Manitou Islands, about 170 m. long by 70 wide, nearly one-fourth of the area of the whole lake; and Manitou Bay, or the North Channel, n. of Manitou Islands. The lake contains many thousands of islands, some estimates reaching 32,000; of which, 3,000 are considerable in size. The Manitou group, of which Great Manitoulin (90 m. long and 30 m. wide) is the largest, extend from a peninsula in the s.e. to the n., and with

Drummond's Island separate another sheet of water from the main lake, Manitou Bay, 80 m. long and 20 m. wide. Lake Huron is subject to violent storms, but navigation is not considered dangerous.

HURO'NIAN-ROCKS, or HURONIAN-FORMATION: in *geol.*, name given by Sir Wm. Logan to a series of strata in the vicinity of Lake Huron, consisting chiefly of quartzite with great masses of greenish chloritic schist, sometimes containing pebbles derived from the Laurentian rocks. These are about 18,000 ft. thick. No organic remains have yet been found in them, and limestones are rare, though one has been found 300 ft. thick, which may yet be proved originally to have had connection with organic life. They are believed to be of Lower Cambrian age, and lie unconformably on the Laurentians.

HU'RON IN'DIANS. See WYANDOTS.

HURONITE, n. *hū'ron-īt* [named from Lake *Huron*]: variety, or sub-variety, of fahlunite; a yellowish-green mineral, with waxy or pearly lustre occurring in hornblendic bowlders near Lake Huron.

HURRA! or HURRAH! int. *hûr-râ':* an exclamation expressive of pleasure or satisfaction; a shout of triumph or applause; the characteristic war cry or cheer of English soldiers and sailors, and of those of the United States, as they go into action or make a charge.

HURRICANE, n. *hŭr'rĭ-kān* [Sp. *huracan;* OF. *houragan;* F. *ouragan*, a hurricane—from a native Amer. word imitative of rushing wind; comp. Gael. *uair-a-cuan*, a tempest of the sea]: violent storm in which the wind blows fitfully with prodigious force. HUR'RI-CA'NO, n. *-kā'nō*, in *OE.*, same sense. See STORMS; WIND; WHIRLWIND; CYCLONE; TYPHOON.

HURRUR. See HARAR.

HURRY, v. *hŭr'rĭ* [O.Sw. *hurra*, to swing, to whirl: Icel. *hurr*, a noise: Swiss, *hurrsch*, a word intended to express rapid action accompanied by a whizzing sound: O.H.G. *hursc*, quick: Ger. *hurtig*, quick, brisk: *arri! harri!* cries in France and Italy to urge on horses]: to hasten; to impel to greater speed; to put into confusion through haste; to move or act with haste: n. haste; a driving or pressing forward, as on business; bustle. HUR'RYING, imp. *-rĭ-ĭng:* ADJ. hastening; quickening: n. the urging to greater speed; rapidity of motion. HUR'RIED, pp. *-rĭd:* ADJ. hastened; urged to rapid motion or vigorous action. HUR'RIEDLY, ad. *-lĭ.* HUR'RIEDNESS, n. HUR'RYINGLY, ad. *-lĭ.* HURRIES, n. plu. *hŭr'rĭz*, stages or frames at the sides of a quay for the convenience of tumbling coal from wagons into the holds of sea-going vessels. HUR'RY-SKUR'RY, ad. *hŭr'rĭ-skŭr'rĭ* [imitative of scampering and rushing about]: confusedly; in a bustle: n. confusion and bustle.—SYN. of 'hurry, v.': to precip-

itate; expedite; quicken; accelerate; speed; dispatch; bustle.

HURST, or HYRST, n. *hėrst* [Dut. *horst,* a bushy place: Swiss, *hurst,* a thicket]: a wood or grove; a postfix in names of places in same sense, as in Hawkhurst; in *her.,* a charge representing a small group of trees, usually borne upon a mount in base.

HURST, *hėrst,* JOHN FLETCHER, D.D., LL.D.: Meth. Epis. bishop; b. Dorchester co., Md., 1834, Aug. 17. He graduated at Dickinson College 1854; studied theol. at the universities of Halle and Heidelberg; entered the ministry of the Meth. Epis. Church 1858; was prof. of theol. in the Martin Mission Institute, Bremen, 1866-70; prof. of historical theol. in Drew Theol. Seminary, N. J., 1871-73, and its pres. 1873-80; and elected bp. 1880, May 12. He has travelled extensively on work of his church in the United States, Europe, and India; has published numerous translations and original works, and received the degree D.D. from Dickinson College 1866, and LL.D. from the same 1877 and Ind. Asbury University.

HURT, n. *hėrt* [Dut. *horten;* F. *heurter;* O.F. *hurter;* It. *urtare,* to dash against: W. *hwrdd,* a stroke, a blow; comp. Gael. *goirteas,* pain, suffering]: a wound; a bruise; injury: v. to give or cause pain to; to wound; to grieve; to injure. HURT'ING, imp. HURT, pt. and pp. *hėrt.* HURT'ERS, n. plu. *-ėrz,* pieces of wood for protecting the parapet from the wheels of gun-carriages. HURT'FUL, a. *-fûl,* injurious; pernicious; occasioning loss or injury. HURT'FULLY, ad. *-lĭ.* HURT'FULNESS, n. HURT'LESS, a. *-lĕs,* in *OE.,* that cannot hurt; harmless; innocent.—SYN. of 'hurt, n.': damage; detriment; harm; prejudice; injustice; wrong; mischief; loss; bane; disadvantage;—of 'hurtful': mischievous; destructive; harmful; baneful; prejudicial; detrimental; disadvantageous; noxious; unwholesome.

HURTLE, v. *hėrt'l* [a dim. of *hurt:* F. *heurter,* to dash against: Norw. *hurra,* to rattle: an imitative word]: to clash or dash together; to rattle; to move violently. HURT'LING, imp.: n. the act of that which hurtles; the rattling, clashing noise sometimes made by a rapidly moving body. HURTLED, pp. *hėrt'ld.*

HURTLE-BERRY, n. *hėrt'l-bĕr'rĭ* [AS. *heort-berie,* hart-berry]: the whortle-berry—which see.

HUSBAND, n. *hŭz'bănd* [Icel. *húsbúandi*—from *hus,* a house; *búandi,* dwelling: AS. *husbonda,* the master of the house—from AS. *hus,* a house; *bonda:* Lap. *banda,* a master: Bohem. *hospod;* L. *hospit',* the lord, the master of the house]: a man joined to a woman by marriage (see HUSBAND AND WIFE); an economist; the manager of the concerns of a ship, as in the phrase *ship's husband:* v. to manage with frugality; to use with economy. HUS'BANDING, imp. HUS'BANDED, pp. HUS'BANDMAN, n. the man who manages the concerns of the soil; a tiller of

the soil; a working farmer. HUS'BANDRY, n. *-bănd-rĭ*, the business of a farmer; frugality; domestic economy. HUS'BANDAGE, *n. -bănd-āj*, the agent's allowance or commission for attending to the business of a ship.—SYN. of 'husbandman': farmer; master; cultivator; tiller; agriculturist.

HUSBANDRY, *hŭz'band-rĭ*, PATRONS OF: secret order in the United States, founded in Washington, D. C., 1867, Dec. 4, for the purpose of promoting the interests of persons engaged in agricultural pursuits, and in business connected therewith. The motive was the general depression of the industries allied to the cultivation of the soil following the civil war. William Saunders, supt. of the gardens and observatories of the agricultural bureau of Washington, becoming familiar with the reports received by the bureau from the various farming regions of the country, and impressed with the results of co-operative labor as shown by the Masonic and Odd Fellow orders, conceived the idea that an application of some of the principles on which those orders had flourished would unite the discouraged farmers and lead to their advancement. After consulting with O. H. Kelley, J. R. Thompson, William M. Ireland, the Rev. A. B. Grosh, and the Rev. John Trimble, Jr., all connected with the depts. at Washington, a ritual was prepared on the basis of those of the Masonic and Odd Fellow orders, and the first body, the National Grange, was organized, with Saunders as master, Thompson, lecturer, Anson Bartlett, overseer, William Muir, steward, A. S. Moss, asst. steward, Grosh, chaplain, Ireland, treas., Kelley, sec., and Edward P. Faris, gatekeeper. To these were subsequently added four offices for women, bearing the titles Ceres, Pomona, Flora, and Lady Asst. Steward. Then followed, with the expansion of the order, the institution of state and subordinate granges; the establishment of grange libraries, comprised wholly of books and periodicals bearing on the agricultural industries; the opening of depots for the co-operative purchase and sale of all needful articles; the assumption by state or subordinate granges or trusted individual members of the functions of the usual middle-men; railroad legislation to promote the interests of producing shippers; and a variety of reforms that could never have been reached by the individual farmer. The principles of the order prohibit any political discussion, agitation, or other work under the name of the order; a wise provision, as the growth of the organization soon excited the attention of professional politicians, who have frequently attempted to gain personal or party benefit through its large and far-reaching membership. The order had established (1903) 27,689 subordinate granges in 44 states and territories.

HUSBAND and WIFE: correlative terms designating the man and woman united in a marriage. For modes of contracting marriage, with the accompanying ceremonies

and the impediments to marriage, see MARRIAGE: for the mode of dissolving marriage, see DIVORCE. Marriage is often spoken of as a mere civil contract. This view is incorrect, because too narrow. Marriage is a relation voluntarily assumed by the parties, not to be broken off or dissolved at the whim of either or both, but to last for life. Whether the relation be divinely ordained or not, the interests of society, of unborn children, of mortality, create rights and obligations flowing out of marriage and enforced by laws which never could arise from mere contract. Indeed it may be doubted whether marriage is a contract at all. In the language of Judge Story 'it is rather to be decreed an institution of society founded upon the consent and contract of the parties.'

I. *Property Rights.*—In respect to property rights growing out of the marriage relation, the law is in an unsettled and transition state. The Common Law of England regarded husband and wife as one person, and as an eminent writer facetiously observes, that person was the husband. (Schouler, *Husband and Wife,* p. 9.)

The condition of the wife during marriage was by this system denominated *coverture,* she being called *feme-covert,* meaning, under the wing, protection, or *cover* of her husband. He was called her *baron* or lord. So far as the husband's property was concerned, the wife became entitled to no part thereof, except to inherit a part of his personality, and a dower right in his real estate. And of this personality he could deprive her by his last will and testament. He, on the contrary, by marriage became absolutely entitled to her personal property, which at his death he might dispose of as he saw fit. He also became entitled to the profits of the wife's lands during the marriage, and if a child was born during the marriage and the husband survived the wife, he became entitled to a life interest in the wife's lands. The respective interests in each other's property given by the English common law to husband and wife are well summarized by the writer already alluded to (Schouler, *Husband and Wife,* p. 118), as follows: 'The husband yields to his wife no participation whatever in his own property, whether acquired before or during the continuance of the marriage relation, except a certain right of inheritance to his goods and chattels, of which he can generally deprive her by his will and testament, and also dower in his real estate, which is her only substantial privilege. In return for this, she parts with all control, for the time being, over her own property, whensoever and howsoever obtained, by gift, grant, purchase, devise, or inheritance; gives him outright her personal property in possession, and allows him to appropriate to himself those outstanding rights which are known as her *choses in action* [uncollected demands, etc.], or all the rest of her personal property; parts with the usufruct of her real estate, creating likewise a possible encumbrance upon it

in the shape of tenancy by the courtesy; and finally takes, if she survives him, only her real estate, such of her personal property as remains undisposed of and unappropriated, with a few articles of wearing apparel and trinkets called *paraphernalia*. She cannot restrain his rights by will. She is not allowed to administer on his personal estate in preference to his own kindred, though the whole of it were once hers; while he can administer on her estate for his own benefit, and exclude her kindred altogether, even from participation in the assets. Thus unequal are the property rights of husband and wife by the strict rule of coverture. We speak not here of recent statutory benefits conferred upon the wife; nor of that relief which equity affords in permitting property to be held to the wife's separate use, and giving her a provision from her choses in action where the husband seeks its aid in appropriating them to his own use; but of what is to be properly termed the common law of husband and wife.' As a sort of compensation, however, for all this thraldom and injustice, the husband was liable for all the debts of the wife contracted before marriage, and for her support. He was also responsible in damage for frauds and wrongs committed by her during marriage. In respect to contracts the wife was incompetent to enter into them during marriage, unless her husband had abjured the realm or been banished, or where by local custom prevailing in certain parts of England, she could carry on a separate trade and contract in reference thereto. Even her earnings belonged to her husband, and the proceeds of their joint labor were also his property. Within recent years in England (1870, 1882), and in the United States, commencing about 1848, statutes known as married women's acts have been enacted which have revolutionized the Common Law idea of strict unity of husband and wife. The general scope of these statutes, which vary in the different states, is to recognize and protect the separate earnings and property of married women. The wife is under these statutes empowered to carry on a separate business or trade, for the debts of which she alone is liable. She may even constitute her husband her agent or clerk to carry on the business for her without, however, giving him or his creditors a right to interfere therewith. But such transactions must be free from fraud, and not mere covers to defraud the husband's creditors. In some states husband and wife may even form commercial co-partnerships together, or the wife can form such a co-partnership with a third person of the opposite sex. The legislation alluded to, has also removed the disability which existed under the English Common Law by which married women were precluded from making wills. Married women can now, as a general rule in the United States, dispose by will of their separate property. Whether the radical changes introduced by the modern legislation above noticed are

entirely beneficial to the marriage relation has been doubted. Thus, Prof. Parsons (1 *Contracts*, 340), an authority well qualified to speak, says, 'We know that in those states in which the greatest changes have been made, and still greater are desired by some persons, there are those who think mischief has already been caused, and that a brief experience will prove the inconvenience and danger of permitting husband and wife to possess interests and properties and powers, altogether, or in a great degree independent and equal. The tendency of this would seem to be, necessarily to make them bargainers with each other, and as watchful against each other and as careful for good security, as strict in making terms and compelling an exact performance of promises or conditions, and as prompt to seek in litigation a remedy for supposed wrongs, as seller and buyer, lender and borrower usually are; and as these parties may be, more properly and safely, than husband and wife.'

II. *Duties.*—Except so far as the separate estate of the wife is concerned, the duties of the married pair and their corresponding rights have not been seriously affected by modern legislation. Making allowances for advancement in refinement and manners, due to the general progress of the age, the duties of husband and wife are substantially as they were under the English Common Law. The husband is the head of the family. While he is bound to furnish the wife with a home and support, it rests primarily with him to choose the home, and to determine what is a suitable support. The wife is bound to love, honor, and obey her husband. Each is entitled to the society and companionship of the other. The old English Common Law permitted the husband to moderately chastise and correct his wife. Corporal punishment is, however, no longer permitted either in this country or in England. From the husband's position as the recognized head of the family follows his right of 'gently restraining,' as it is termed, his wife from gross misconduct, of preventing her from visiting objectionable places, and from receiving unsuitable visitors in the household. The custody of children formerly belonged almost exclusively to the father. At the present day, however, while the father's rights in this respect are seldom interfered with, except in cases of misconduct, the interests of the children themselves are of paramount consideration. Their custody will depend upon the circumstances of the case, and will be denied to that parent who has proved himself or herself unworthy. The support which the husband is bound to give the wife includes food, clothing, shelter, and medical attendance, according to his means and position. He is also bound decently to bury his wife after death. So long as the husband provides the wife with a proper support and with a home, he is responsible for only such necessaries as he furnishes her, or which it may be presumed from the relation and circumstances

of the parties he intended to furnish or ought to have furnished her. If he denies her a proper support, or by his immoral or cruel treatment drives her from his home, he will still be responsible for her support. What are necessaries, sufficient to charge the husband with liability to a tradesman furnishing them, depends not only on the husband's position and income, but also on the apparent position which he has permitted the wife to assume in the eyes of the world. As a general thing it may be stated that the husband is bound to support his wife, notwithstanding she owns a separate estate. Very extreme views have been taken by the courts as to what articles are necessaries, and no definite rule can be laid down except the general one above stated. In many states the wife's separate estate may become liable to tradesmen for necessaries furnished her irrespective of her husband's solvency or means.

III. *Disabilities.*—Under the English Common Law, neither husband nor wife could be witnesses for or against each other in civil suits in which either party was interested. Nor could either of them give any testimony in a civil or criminal case where such testimony might criminate the other. To the last rule there was a notable exception in the case where the wife charged the husband with an assault or other crime of greater degree upon her person. Otherwise the crime might have gone unpunished. These rules derived their force and were founded upon the sanctity of the marriage relation and the desire of the law to preserve the inviolability of that state. In strictness, however, these rigid rules produced much hardship, and they have been modified to suit the exigencies of the times. Thus in N. Y., it is provided with respect to civil trials that husbands and wives are not competent to testify against the other on allegations of adultery except to prove marriage. Neither can be compelled, or without the consent of the other, if living, allowed to disclose a confidential communication made by one to the other during marriage. In an action for criminal conversation, the plaintiff's wife is not a competent witness for the plaintiff, but she is a competent witness for the defendant as to any matter in controversy, except that she cannot without the plaintiff's consent disclose any confidential communication had, or made between herself and the plaintiff. And in respect to criminal trials, it is provided that the husbands, or wives of persons indicted or accused of crime are in all cases competent witnesses on the examination or trial of such persons, but that neither the husband nor the wife can be compelled to disclose confidential communications made by one to the other during their marriage.

IV. *Torts and Crimes.*—If torts (civil injuries) are committed by the wife in the husband's company, or by his order, the husband alone is liable for the damages resulting to third parties therefrom. If they are not so

committed, husband and wife are jointly liable. Concerning the wife's liability for crime, Bishop (1 *Law of Married Women*, 23), speaking generally says: 'The central proposition is, that, while the wife has general capacity for crime, she shall still not be held responsible if she commits what would otherwise be a crime through constraint of her will by the husband; for then she is supposed not to have the necessary criminal intent. But in order for her to be excused on this ground, the husband must be present with her when she commits the act. If he is thus present, and the act is an ordinary misdemeanor, or a felony of the lighter kind, the presumption is, that it is done by his coercion, and the contrary must be proved in order to charge the wife. When we come to the higher felonies, as treason, murder (and some add robbery), there is no presumption of coercion by the husband, and for the wife to defend herself when charged with them on this ground, actual coercion must be shown. The same is true of those misdemeanors which are said to be 'peculiar to the female sex,' such as the keeping of brothels; in these cases, though the husband be present, the presumption is that the wife acted from her own volition. In N. Y., however, and possibly in other jurisdictions, the legislatures have gone further, and declared that the mere presence of the husband shall in no case be a defense to the wife charged with the commission of a crime. See also GOODS IN COMMUNION; WILL; TERCE; MARRIAGE; DIVORCE.

HUSH, v. *hŭsh* [W. *hust*, a low buzzing noise (see HISS)]: to still; to render silent. HUSH'ING, imp. HUSHED, pp. *hŭsht*. HUSH-MONEY, a bribe for silence. HUSH! impera., silence; be still: ADJ. still; quiet; silent. TO HUSH UP, to conceal or suppress; to avoid mention of.

HUSHING, n. *hŭsh'ĭng* [prob. a corruption of *flushing*]: term applied to one mode of exposing and collecting ore. In a ravine where surface ore is exposed or but lightly covered, a body of water is dammed and then allowed to flow through the ravine, tearing up the earth and stones and exposing new surfaces, from which the ore is gathered; a process of clearing water from the surface of ore, in stream works, by diverting and directing streams of water on it.

HUSK, n. *hŭsk* [Sw. *hylsa*, a pod: Low Ger. *hulse*, a husk: Dut. *hulsche*, covering of seeds: Dut. *huysken*, a case in which a thing is kept: comp. Gael. *seasg;* W. *hesg*, dry, barren]: the dry external covering of many fruits and seeds: v. to remove the husks from. HUSK'ING, imp.: n. the act of stripping off husks. HUSKED, pp. *hŭskt*, covered with a husk; stripped of husks. HUSK'Y, a. *-ĭ*, abounding with or consisting of husks; dry; rough.

HUSKISSON, *hŭs'kĭs-on*, WILLIAM: English statesman: 1770, Mar. 11—1830, Sep. 15; b. Birch Moreton, Worcestershire. He was sent to Paris 1783 to study medicine. He took part in the storming of the Bastile, and

as a member of the Club of 1789, attracted attention by speeches on political economy. In 1792, he returned to England, received a subordinate appointment under the tory govt., and formed an intimate acquaintance with Pitt and Canning. In 1795 he was selected by Dundas, the war minister, to be first under-sec., and sat in parliament for Morpeth. He subsequently held several offices under Pitt, with whom he retired 1801, and on the dissolution of parliament 1802, lost his seat in the house of commons. In 1804, he was returned for Liskeard, and was appointed sec. of the treasury in the new Pitt cabinet. On Pitt's death 1806, he lost this office, but was restored to it by Mr. Percival 1807. He sat for Harwich, 1807-12; Chichester, 1812-23; and Liverpool, 1823-30. In 1814, he was chief commissioner of the woods and forests; 1822, pres. of the Board of Trade; 1827, sec. of state for the colonies; 1828, sec. of state for foreign affairs. But this office he resigned, and retired from the ministry the same year. Through his exertions the old restrictions on the trade of the colonies with foreign countries were removed. He also obtained the removal or reduction of many import duties, considerable relaxation of the navigation laws, and is allowed to have been the great pioneer of free trade. He received fatal injuries by being struck by an engine at the opening of the Liverpool and Manchester railway, and died the same evening. A collection of his speeches was published 1831, interesting from their comprehensiveness of views and fulness of accurate details.

HUSKY, a. *hŭsk'ĭ* [Dut. *hoest;* Icel. *hósti;* Ger. *husten,* a cough]: dry and rough in the throat, the condition arising from cold or other cause, producing muffled imperfect speech; hoarse. HUSK'ILY, ad. *-lĭ.* HUSK'INESS, n. roughness of sound of the voice; hoarseness.

HUSS, HENRY GOLDEN: American composer; b. Newark, N. J., 1861, June 21. In 1882 he entered the Munich Conservatory, Germany, and studied music, in theory and practice, under Rheinberger, Giehrl, and Abel. In 1885 he settled in New York, where he has had a successful career as composer, performer, and teacher.

HUSS, *hŭs,* JOHN: Bohemian reformer and martyr, whose name is associated with that of Jerome of Prague (q.v.), on account both of the work which they wrought, and of the death which they suffered: prob. 1369, July 6 —1415, July 6; b. Hussinecz, near Prachaticz, in s. Bohemia. He studied at the Univ. of Prague, where he soon made great progress in the branches of learning most valued in that age, took his degree of master of arts 1396, and began to lecture publicly 1398. In 1402, he became preacher in the Bethlehem Chapel, Prague, and labored with the greatest earnestness for the instruction of the people, and in the discharge of all his clerical functions. As a preacher, he was greatly esteemed both by the common people, and by the students; while as con-

fessor to Queen Sophia, he obtained access to the court. At this time he became acquainted with the writings of Wickliffe, which exercised great influence over him. The monks and clergy became violent enemies to Huss, as he denounced, with continually increasing boldness, their corruptions. Abp. Sbinko publicly burned the writings of Wickliffe 1410, in compliance with a brief of Pope Alexander V., and complained to the pope of Huss as a Wickliffite. Hereupon he was summoned to Rome; but he did not go, and the combined influence of the people, the court, and the university, compelled the abp. to remove a prohibition which he had issued against his preaching. But in 1412, Pope John XXIII. having published a bull of indulgence in order to a crusade against Ladislaus, the excommunicated king of Naples, whose kingdom the pope claimed as a papal fief, Huss boldly raised his voice against the whole procedure as unchristian, while Jerome of Prague also stood forth to condemn, in the strongest manner, both the bull and the vendors of indulgences. An interdict against Huss, 1413, was the consequence. Huss, however, appealed from the pope to a general council and to Christ; and wrote a book *De Ecclesia* (*On the Church*), in which he condemned the abuses of the papacy, and denied the unconditional supremacy of the Roman pontiff. Thinking himself no longer safe in Prague, he now retired to his native place, where he preached the gospel with great power. In 1414, he went to Constance to the general council, summoned thither, indeed, on a charge of heresy, but under the protection of King Wenceslaus, and having a safe-conduct from Emperor Sigismund. Having reached Constance Nov. 3, he was on the 28th, apprehended in spite of the remonstrances of the Bohemian and Polish nobles. His trial was conducted with little regard even to the appearance of equity. 1415, July 6, thirty-nine charges were exhibited against him, some of which he acknowledged as exhibiting his doctrine, while others he utterly denied. Being required to recant his alleged errors—especially his assertion in *De Ecclesia*, that Christ, not Peter, is the Head of the Church—he refused to do so till they should be proved to be errors. He and his writings were now condemned to the fire, and in spite of his safe-conduct, the sentence was carried out on the same day, and the ashes of the martyr were thrown into the Rhine. See Palacky's *Gesch. von Böhmen*. Huss was not distinguished for surpassing intellectual gifts, but he affords an instance of sublime moral strength. It has been said that he took from Wickliffe's hand the torch of reformation and passed it on to be taken and borne by Luther.

HUSSAR, n. *hûz-zâr'* [Magyar, *huszar*, a light horseman]: a light armed horse soldier, adapted to harass the enemy: he is dressed in a loose jacket, with other articles of attire easy in set, and a fur cap; armed usually with a

sabre and pistol. *Note.*—Said to be so named from *husz,* twenty, because in 1458 a king of Hungary ordered that the corps should be raised by selecting one man from every 20 in a village.

HUSSIF, n. *hŭs'sĭf* [AS. *hus,* a house: Icel. *húsi,* a case; *hûs,* a house]: a case used by seamstresses to contain cotton, worsted, needles, etc. *Note.*—The *f* in HUSSIF is excrescent; the word is not=*housewife*—see Skeat.

HUSSITE, n. *hûs'sīt:* follower of John Huss (q.v.), Bohemian reformer. The followers of Huss, honoring him and Jerome of Prague as martyrs, despised the decrees and anathemas of the Council, and took terrible revenge on the priests and monks. The symbol of their confederacy was the cup, the use of which in the Lord's Supper they extended to the laity, as James de Misa had already done with the approbation of Huss. In 1417, King Wenceslaus was constrained to grant them the use of many churches. After his death, 1419, Aug. 13, the majority of the states refused to acknowledge his brother, Emperor Sigismund, who had broken his safe-conduct to Huss. The papal instructions to the cardinal legate, John Dominico, required him to take violent measures for the conversion of the Hussites. An insurrection ensued, and the war began, known in history as the Hussite war. Convents and churches were reduced to ashes, and priests and monks were slain. The Hussites divided into two parties—the *Calixtines* (q.v.), and the *Taborites* (q.v.). See *Huss et la Guerre des Hussites,* by Ernest Denis (1879).

HUSSY, or HUSSIE, n. *hŭz'ĭ* [contr. for *housewife:* AS., Icel. *hus,* a house, and Eng. *wife*]: applied to a female as a term of slight reproach.

HUSTINGS, n. plu. *hŭs'tĭngz* [AS. *husting,* the house or domestic court, a place of council—from AS. *hus,* a house; Icel. *thing,* Dan. *ting,* a court of justice]: the municipal court of the city of London; also the platform from which candidates for parliament, till the passing of the Ballot Act 1872, addressed the electors on the day of nomination.

HUSTLE, v. *hŭs'l* [Dut. *hutselen,* to shake to and fro: Norw. *huska,* to rock, to swing: comp. Gael. *tuisle,* to stumble, to fall: Dut. *hotsen,* to shake, to jolt]: to shake together in confusion; to push or crowd; to jostle in a crowd. HUSTLING, imp. *hŭs'lĭng.* HUSTLED, pp. *hŭs'ld.*

HUSWIFE, n. *hŭz'wĭf* [other spelling of *housewife* (see HUSSIF)]: a female manager of a house.

HUT, n. *hŭt* [F. *hutte,* a shed, a hut: W. *hotan;* O.Ger. *hot,* a cap: Dut. *hutte,* a cabin]: slight temporary erection; a mean dwelling: V. to place in huts. HUT'TING, imp. HUT'TED, pp.

HUT, *hŭt:* light construction, usually wooden, more or less rough in its details. It is often substituted for a

tent for the housing of troops, when the sojourn in a camp or cantonment is likely to be of some continuance, as, for instance, through a winter. A hut, however rude, being wind and water-tight, is as superior in comfort to a tent as a tent is to the open air. Huts may be made of almost any size, and are sometimes for one officer; at others, for as many as 100 men.

The hut is as useful to the settler in a wild country as it is to a soldier. Huts are of various sorts: among these are the *log* hut, the *framed* hut, and the *pisé* hut (of tempered clay).

The *log* hut is formed of rough logs or trunks of trees, laid crosswise in tiers to the required height, the angles being formed by a notch on each side of the log, about one-third of its diameter in depth, and a few inches from the extremity. The space between the logs is then made water-tight and air-tight by a stuffing of clay, wattles, sallows, or small bundles of twigs. Within, the joints should be lined with laths, or the whole interior may be boarded with inch-planks, if such are attainable. The roof should be supported by a scantling (see ROOF), and may consist of overlapping boards, or boards laid flush and shingled, or laths and shingles, or even birch-bark alone. The door is usually ledged, and there are one or two windows, with glazed sashes and shutters. These should be made by regular carpenters, and taken to the place of building ready for use. A hut thus formed makes a snug habitation, and will last many years; exclusive of the sashes, two men can erect, in about a week, a hut of rough logs sufficiently large for their residence —i.e., with interior area 15 ft. by 10 ft. When circumstances permit, the logs are occasionally squared, which enables them to be fitted more accurately to each other, and adds, of course, to the solidity and finish of the whole structure, as well as to its durability. In this case, the corner logs, instead of crossing each other, are joined by a dove-tail, or by cutting the end of each to an angle of 45°.

The *framed* hut has the advantage over the log hut of allowing more exactness of finish, and from its lightness and portability being easily transported to any place where logs for hut-building might not be forthcoming. It consists of a strong framework of squared wood, properly fitted together, and covered with overlapping planks or weatherboards. The pieces should be sawn to the proper size, fitted to each other, and numbered; then packed together in small compass for conveyance to the intended site, where the structure can soon be erected. No one piece need exceed 11 ft. in length, 6 inches in breadth, and 2 inches in thickness. The uprights should be not more than 15 to 18 inches apart, and should be firmly held by diagonal tie-rods. The first step is carefully to level the ground on which the hut is to stand, and if a dwarf-wall of stone or brick, 8 or 10 inches

high, can be built round, so much the better. On this ground or wall a rectangular frame of thick wood (say 6 inches by 3) must be laid as a basis for the framework; on this latter the uprights are placed, the binding tie-rods fixed, and the cap-sill, corresponding to the frame below, placed above all, every joint being carefully mortised and tenoned. The weather-boards can now be nailed on the outside, and when the roof is put on the hut is complete. The breadth should not, for stability, exceed 16 ft.; and when the hut is of considerable length, cross-beams should be thrown from side to side at the top. The roof should be made of ordinary scantling (see ROOF). It is usually estimated that one of these huts, 30 ft. long, 16 broad, and 10 high, makes a good barrack-room for 20 soldiers. When extra warmth is desired the spaces between the uprights are filled in roughly with bricks, burned or unburned.

Pisé huts, common in s. France, and useful where wood is scarce, as well as very comfortable, are walled with blocks of clayey earth, rammed with great pressure into wooden molds until they assume the forms of stones. These are laid one above the other much as stones would be by a mason, and the wall so formed is both durable and sightly, and the abode is comfortable.

The most critical operation for the non-professional hut-builder is roofing. This is usually of thatch, shingles, planks, paper, or felt, if lightness be an object; sometimes of stones, bricks, or tiles, if the walls be calculated to bear their pressure.

HUTCH, n. *hŭch* [F. *huche*, a chest or bin—from mid. L. *hutĭca:* Dut. *hok*, a cote for animals: Norw. *hokk*, a small apartment]: a chest or bin; a coop for rabbits; a basket or cage in which the miners bring the coals from the mines: V. to hoard or lay up, as in a chest. HUTCH'-ING, imp. HUTCHED, pp. *hŭcht.*

HUTCHESON, *hŭch'ē-son*, FRANCIS: philosopher: 1694, Aug. 8—1746; b. n. Ireland; son of a Presb. minister. He studied for the ministry at the Univ. of Glasgow; but shortly after the completion of his theological course, he was induced to open a private academy in Dublin, which proved very successful. In 1720, he published *Inquiry into the Original of our Ideas of Beauty and Virtue*, etc., which introduced him to the notice of many influential personages, such as Lord Granville, then lord-lieut. of Ireland, Abp. King, Primate Boulter, and others. This work was followed, 1728, by *Essay on the Nature and Conduct of the Passions;* and the next year he was appointed prof. of moral philosophy in the Univ. of Glasgow. His largest and most important work, *A System of Moral Philosophy*, was published at Glasgow 1755 by his son, Francis Hutcheson, M.D., with a Preface on his Life, Writings and Character. Hutcheson was a man of warm feelings and benevolent impulses. As a metaphysician, Hutcheson may be considered a pioneer of the so-called

'Scotch school.' From the period of his lectures, according to Dugald Stewart, may be dated the metaphysical philosophy of Scotland, and, indeed, the literary taste in general, which marked that country during the last century, though, as Stewart acknowledges and Hamilton shows, traces of the Scotch philosophy appear in earlier writers. But Hutcheson shines as a moral philosopher, rather than as a metaphysician. His system is largely that of Shaftesbury (though, especially in the *Moral Philosophy,* considerably influenced by Butler), and much more complete, coherent, and clearly illustrated. Hutcheson is a strong opponent of the doctrine that benevolence has a selfish origin. The faculty by which moral distinctions are recognized, Hutcheson (after Shaftesbury) terms a *moral sense.* The commentary, *Francis Hutcheson,* by W. R. Scott, is invaluable to the student of Hutcheson. See ETHICS.

HUTCHINS, *hŭch'ĭnz,* THOMAS: 1730-1789, Apr. 28; b. Monmouth, N. J.: geographer. He entered the British milit. service 1745, became an officer in the 60th royal American regt., was asst. engineer in Gen. Henry Bouquet's expedition against the Shawnee Indians 1764, served in the Indian campaign in Fla., was imprisoned in London for sympathy with the American colonists 1779, and after release became geographer-gen. on the staff of Gen. Nathaniel Greene in S. C. He prepared the maps and plates of Dr. William Smith's *Account of Bouquet's Expedition* (1765), and published *A Topographical Description of Virginia, Pennsylvania, Maryland, and North Carolina* (1778); *History, Narrative, and Topographical Description of Louisiana and West Florida* (1784), and several papers in the *Transactions* of Philadelphia scientific societies.

HUTCHINSON, *hŭch'ĭn-son:* city, cap. of Reno co., Kan.; on the Ark. river, and on the Atchison, Topeka & Santa Fé, the Chicago, Rock Island & Pacific and the Hutchinson & Southern railroads; 155 m. s.w. of Topeka. It was founded 1871 by Clinton B. Hutchinson, who built Ottawa, Kan.; is central to a large and unusually rich agricultural region, and has the largest and purest deposit of rock salt in the country. The vein was struck at a depth of 400-475 ft., is 300 ft. thick, 99.87 per cent. pure, and covers an area of 10 m. each way. Hutchinson has a packing-house with a capacity of 3,000 hogs daily, and other beef and hog packing establishments. Its retail trade extends to the 7 adjoining counties, and amounts annually to $6,500,000. The city contains banks, large stock yards, salt companies, waterworks, gas and electric light systems, street railroads, telegraph and telephone service, manufactories of lumber, machinery, boilers, etc., and the H. & S. railroad shops. The government, under the charter of 1872, consists of a mayor, elected biennially, and a council. There are numerous churches, public schools, 4 bridges across the

Ark. river, public library, co. court-house, reformatory that cost $1,000,000, and a daily newspaper. Pop. (1900) 9,379.

HUTCHINSON, *hŭch'ĭn-son*, ANNE: religious enthusiast: 1590-1643; b. Lincolnshire, England. She emigrated 1636 to Boston, where she was a member in the First Church. At that time of high tension in religious discussion, she claimed to be a medium of divine revelations, and held meetings for women, in which she criticised the doctrines of Dr. Cotton's sermons, and held forth Antinomian opinions, afterwards strongly stigmatized by Cotton Mather. Great controversies arose, and a synod was called, in which her teachings were condemned, and she was banished from the colony. She and her friends obtained from the chief of the Narragansetts liberty to reside in Rhode Island, where they set up a community on the highly commendable principle, that no one was to be 'accounted a delinquent for doctrine.' After the death of her husband (who shared her opinions), she removed to a Dutch settlement, in the colony of New York, Westchester co., where she and her whole family of 15 persons were taken prisoners by the Indians, and all but one daughter murdered.

HUTCHINSON, *hŭch'ĭn-son*, JOHN: 1617-1664, Sep. 11; b. Nottinghamshire, England: Puritan and regicide. He was of good family and highly educated; married Lucy Apsley, daughter of the gov. of the Tower of London, 1638; became lieut.col. in the parliamentary army 1642; gov. of the town and castle of Nottingham, which he defended against a royalist siege 1643; one of the judges who condemned Charles I.; member of parliament, and of the council of state. He opposed the later conduct of Cromwell, was pardoned at the restoration, and died in confinement under suspicion of treasonable intent. *Memoirs of Colonel Hutchinson* by his widow was published in London 1806.

HUTCHINSON, JOHN: 1674-1737, Aug. 28; b. Spennithorne, Yorkshire: English theological writer. He was steward of the household of the Duke of Somerset, and left his service to apply himself to religious studies, the duke procuring for him a sinecure appointment of £200 a year from government. In 1724, he published the first part of a work called *Moses' Principia*, in which he defended what he regarded as the Mosaic cosmogony, and assailed Newton's theory of gravitation. He published a succession of works till his death. His religious system is best exhibited in his *Thoughts concerning Religion*. The leading principle of it is, that the Holy Scriptures contain the elements not only of true religion, but of all rational philosophy, which, however, was to be derived only from the original Hebrew; and the Hebrew, for that purpose, was subjected to strange fanciful processes. His followers were called HUTCHINSONIANS, and among

them—strange as it may seem—were persons of considerable learning and celebrity.

HUTCHINSON, THOMAS: 1711, Sep. 9—1780, June 3; b. Boston: royal gov. of Massachusetts. He graduated at Harvard College 1727, studied law; entered his father's counting-house; was a representative of Boston in the gen. court of Mass. 1737-49, and three times speaker; was appointed lieut.gov. 1756, chief justice of Mass. 1760, acting gov. 1769, and gov. 1771; and went to England 1774, where he received a crown pension and died. He was an active tory; in constant opposition to assembly and council; and resigned office after the privy council refused the petition of the gen. court of Mass. for his removal, based on letters from Benjamin Franklin which created the impression that Hutchinson had officially advised the enforcement of stringent measures by the English govt. against the American colonists.

HUTCHINSONIANS: see HUTCHINSON, JOHN (b. 1674).

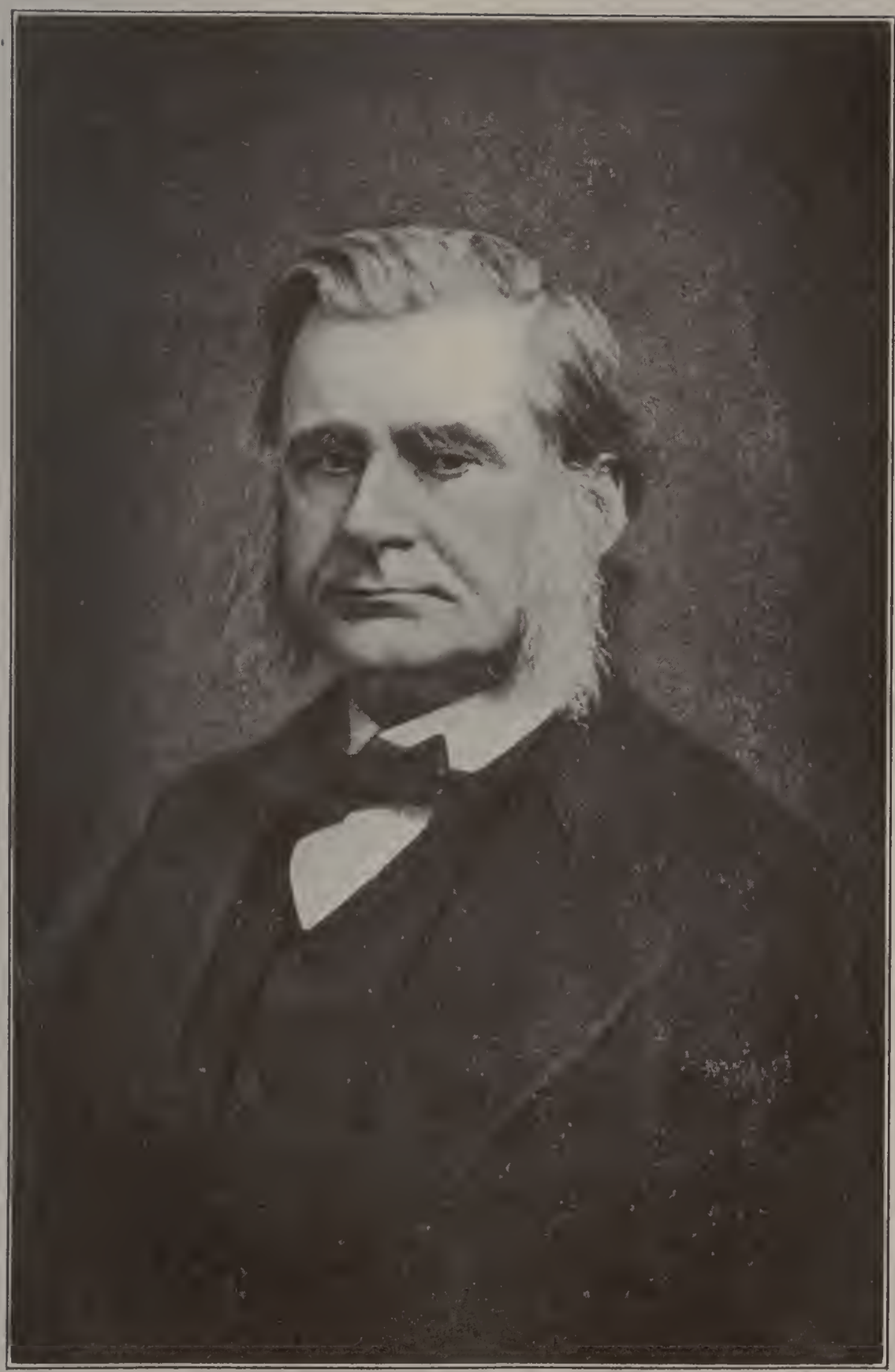
HUTTEN, *hût'ên*, ULRICH VON: 1488, Apr. 21—1523, Aug. 23: of an ancient and noble family: b. at the family castle of Steckelberg, in the electorate of Hesse. When he was ten years of age, he was placed in the monastery at Fulda; but disliking this mode of life, he fled to Erfurt 1504, where he associated with scholars and poets. He then lived at various places in n. Germany till about 1512, when he went to Pavia to study law. After several years in Italy, he returned to Germany, and made himself conspicuous by his publications, especially those concerning the affair of Reuchlin and the Dominican Hoogstraten, in Cologne, in which he came to the support of Reuchlin, and displayed no small learning and great power of satire. He again went to Italy 1515, to take the degree doctor of law, and returned to his native country 1517. He was crowned with the poet's laurel crown at Augsburg, and Emperor Maximilian conferred on him the honor of knighthood. In the same year he edited a work of Laurentius Valla, found in a convent, *De Falsâ Creditâ et Ementitâ Donatione Constantini Magni*, and 1518 accompanied Albert, Abp. of Mentz, to the diet of Augsburg, where Luther had his famous conference with Cajetan. Subsequently, he established a small printing-press of his own, and employed himself in writing and spreading pamphlets fully exposing the arrogance and wickedness of the clergy. Abp. Albert denounced him to Rome, whereupon he entered into an immediate and avowed connection with Luther, whom he had hitherto despised. At this time, also, he began to write in the German language, instead of Latin. Persecuted by his enemies, he availed himself of the protection of Franz von Sickingen, but was soon forced to flee. From this time Hutten was compelled to adopt a wandering life, and died in the Isle of Ufenau, in the Lake of Zürich. Hutten was bolder and more open in the expression of his

opinions than almost any man of his age. He did much to prepare the way for the Reformation, and to promote it, though by keen satire rather than by moral and spiritual weapons. He was a man of brilliant genius, restless vanity, immoral life, and doleful end; yet he had qualities that drew the admiration and friendship of many distinguished and upright men, whose affection toward him was probably largely pity. He was reckless of consequences, and not careful in dealing with things that had become venerable in the eyes of many; but he was a man who feared nothing, even when almost all his friends trembled. He was a master of the Latin language. He left 45 different works, of which a collective edition was published at Berlin 1821-27, 6 vols. Hutten had a share in the *Epistolæ Obscurorum Virorum* (q.v.). See Life by D. F. Strauss (1858), English trans. (1874).

HUTTON, *hŭt'on*, CHARLES, LL.D.: English mathematician: 1737, Aug. 14—1823, Jan. 27; b. Newcastle-upon-Tyne; son of a superintendent of mines. He became teacher in a school at Jesmond 1755, and afterward at Newcastle till 1773. During this period, he published *Treatise on Arithmetic and Book-keeping* (1764); *Treatise on Mensuration* (London 1771); and *Principles of Bridges, and Mathematical Demonstration of the Laws of Arches* (Newcastle 1772). In 1773, he was appointed to the professorship of mathematics at the Royal Military Acad., Woolwich, and 1774, Nov., was elected a fellow of the Royal Society. Soon after this, he was selected to perform the calculations for determining the density of the earth from Dr. Maskelyne's observations on Schiehallion, and his report was published in *Philosophical Transactions* 1778.

HUTTON, FREDERICK REMSEN: an American engineer; b. in New York 1853, May 28; was graduated at Columbia College 1873; became professor of mechanical engineering there 1882, and dean of the faculty of applied science in 1899. He was trustee of the Collegiate School, New York; associate editor of *Engineering Magazine;* and of *Johnson's Cyclopædia;* and author of *Heat and Heat Engines; Machine Tools; Mechanical Engineering at Power Plants,* etc.

HUTTON, JAMES, M.D.: one of the founders of geological science: 1726, June 3—1797, Mar. 26; b. Edinburgh. He studied in his native city, and afterward at Leyden, where he took the degree M.D. He applied himself, however, not to the medical profession, but to agricultural pursuits and to the science of chemistry, from which he was led to mineralogy and geology. He contributed much to the improvement of agriculture in Britain. He made some chemical discoveries, and is the author of a Theory of the Earth and of a Theory of Rain. His Theory of Rain has been since acknowledged by men of science as generally correct, though at first it met opposition. His Theory of the Earth—announcing the



THOMAS HUXLEY.

principle that geology is not cosmogony, but must deal with the materials of the earth—has for its distinguishing feature the supposed agency of a central heat, by which the elevation of strata and many other phenomena are accounted for.

HUTTON, LAURENCE: an American author; b. in New York 1843, Aug. 8; d. Princeton, N. J., 1904, June 10. He became dramatic critic on the New York *Evening Mail;* was literary editor of *Harper's Magazine* 1886-98; and author of *Other Times and Other Seasons; Plays and Players; Artists of the 19th Century: Edwin Booth; Boy I Knew; Literary Landmarks of Florence; Literary Landmarks of Venice; Literary Landmarks of Jerusalem,* etc.

HUXLEY, *hŭks'lĭ,* THOMAS HENRY, LL.D.: naturalist: 1825, May 4—1895, June 28; b. Ealing, Middlesex, England. He was educated at the school in that town, and afterward studied medicine in the medical school of Charing Cross Hospital. In 1846, he entered the medical service of the royal navy, and did duty at Haslar until the winter of the same year, when he was appointed assistant surgeon on board the *Rattlesnake.* This vessel, commanded by Capt. Owen Stanley, was commissioned to survey the intricate passage within the Barrier Reef skirting the e. shores of Australia, and to explore the sea between the n. end of that reef and New Guinea and the Louisiade archipelago. Imbued with a passion for natural history, Huxley applied himself to the study of the numerous marine animals collected during the survey, and made them the subjects of scientific papers, which he sent home, diffident as to their value. They were published, however, by the Royal Soc. and the Linnæan Soc., and made their author known, while yet young, to the naturalists of Europe. Toward the end of 1850, the *Rattlesnake* returned to England, and Huxley had the gratification to find that his paper *On the Anatomy and Affinities of the Family of the Medusæ* had been published in *Philosophical Transactions.* Thus encouraged, he set to work to arrange his large accumulation of facts and observations, with a hope (which was disappointed) that the admiralty would contribute toward the cost of their publication. In 1851, papers on other branches of the same subject were printed in *Philosophical Transactions;* and in the same year Huxley was elected a fellow of the Royal Society. In 1852, one of the two Royal Medals annually given by the Soc. was awarded to him, in recognition of the scientific value of his papers, in which much light was thrown on the structure of a number of animals unknown, or little known, to British naturalists. In 1854, Huxley was appointed prof. of natural history in the Royal School of Mines, and, among his lectures in that institution, were several courses to workingmen with beneficial results. In 1857, jointly with Dr. Tyndall, he wrote *Observations on Glaciers,* printed in

Philosophical Transactions; and in the following year he delivered the Royal Society's Croonian lecture, *On the Theory of the Vertebrate Skull,* in which a highly important anatomical question was discussed. In 1859, his large work, *The Oceanic Hydrozoa; a Description of the Calycophoridæ and Physophoridæ,* observed during his voyage, was published by the Roy. Soc. with illustrative plates. He has since published papers on the Glyptodon, and the Osteology of that genus; and in papers on the Mollusca, has shown that those animals have a common type or plan, similarly to the Annulosa and Vertebrata. Huxley contributed largely to the *English Cyclopædia;* and papers by him have appeared in the journals of the Royal, the Linnæan, the Geological, the Zoological, and other learned societies. *Man's Place in Nature* appeared 1863; *Lectures on Comparative Anatomy* 1864; *Lessons in Elementary Physiology* 1866; *An Introduction to the Classification of Animals* 1869; *Lay Sermons,* etc., 1870; *Critiques and Addresses* 1873; *American Addresses and Physiography* 1877; a short work on *Hume* 1879; and *Science and Culture* 1881. Dr. Huxley was a member of the London school board till 1872. He was prof. of natural history in the Royal School of Mines, and Hunterian prof. of anatomy to the Royal College of Surgeons; and LL.D. of Edinburgh, Dublin, and Cambridge. He was inspector of fisheries 1881-85. As a keen and accurate observer of phenomena, Dr. Huxley has rendered service of a high order. As a strong advocate of the evolution hypothesis, he has not always held himself aloof from discussion pertaining to metaphysics rather than to physical science.

HUY, *hoy:* strongly fortified town of Belgium, the province of Liege, romantically situated amid lofty rocks on both banks of the Meuse, and in the immediate neighborhood of the finest scenery of that river, 17 m. s.w. of Liege. Its citadel, the works of which are partly excavated in the solid rock, commands the passage of the river. The church of Notre Dame, a graceful Gothic edifice, was begun 1311. In the vicinity are iron-works and coal mines, in the products of which the inhabitants carry on a lively trade by means of the Liege and Namur railway. The principal manufactures are paper, leather, zinc, beer, spirits, and an inferior wine. Peter the Hermit, on his return from the first Crusade, founded here the former abbey of Neufmoustier (*Novum Monasterium*), and was himself interred within it. Huy has been frequently taken during the wars, of which this region has been the scene. It was captured last by Marlborough and Coehoorn 1703. Pop. 14,486.

HUYGHENS, *hī'gĕnz,* D. *hoy'chĕnz* (VAN ZUYLICHEM), CHRISTIAN: one of the great philosophers of the 17th c.: 1629, Apr. 14—1695, June 8; b. at the Hague; second son of Sir Constantine Huyghens (1596-1687), who was a Dutch poet and diplomatist, and coun-

cilor to the princes of Orange. Huyghens studied at Leyden and Breda. His first work, *Theoremata de Quadratura Hyperboles, Ellipsis, et Circuli, ex Dato Portionum Gravitatis Centro* (Leyden 1651), is an example of that powerful geometrical talent which lay at the foundation of all his scientific achievements. Soon after this, he constructed the pendulum-clock, following out the idea suggested by Galileo (see GALILEI). A complete description of Huyghens's instrument is in his great work, *Horologium Oscillatorium, sive de Motu Pendulorum* (Hague 1658). This work contains expositions of many of the cases of constrained motion, especially those applicable to the construction of time-keepers. Huyghens has also developed and given precision to the investigations of Galileo on accelerated motion under the action of gravity; and there is no doubt, that to the clearness of his demonstrations, his great successor, Newton, in preparing his magnificent development of the principle of accelerating force, was largely indebted. Newton was a student and admirer of his works, and assigns to him, with Sir C. Wren and Wallis, the distinguished epithet of *hujus ætatis geometrarum facile principes.*

By means of an improved telescope of his own construction Huyghens discovered the ring of Saturn and the fourth satellite of that planet 1655. In 1659, he published an account of these discoveries in *Systema Saturnium, sive de Causis Mirandorum Saturni Phenomenon, et Comite ejus Planetâ Novo.* In the end of this work is described an invention of great importance in astronomy —the Micrometer (q.v.), by which small angles between objects viewed by telescope are accurately measured. In 1660, Huyghens visited England, where he was admitted a member of the Royal Society. He discovered the laws of collision of elastic bodies about the same time with Wallis and Wren, and also made a material improvement in the air-pump. In 1666, Huyghens received an invitation to settle in France, with the promise of a pension from Colbert, then all-powerful in that country. He went to Paris, where he remained till 1681, having been admitted to the membership of the Royal Acad. of Sciences; but alarmed at the danger which seemed impending over the Protestants, he returned to his own country. After his return, he continued his favorite pursuits till his death at the Hague.

The optical works of Huyghens claim attention. They are remarkable as maintaining a theory of light, which, opposed to the then more popular theory of Newton, is substantially the same with that now called the *undulatory theory.* By means of his theory, the product of his powerful scientific imagination, he explained the ordinary phenomena of reflection and refraction, and further succeeded in a satisfactory explanation of the phenomenon of double refraction, which Newton's theory failed to account for.

HUYSMANS, *hīs-mäns,* JORRIS KARL: French novelist; b. Paris 1848, Feb. 5; d. 1907, May 12. He studied law and entered the French civil service, but abandoned it for literature. At first a pronounced realist, he turned to idealism and even mysticism. He first attracted notice by the story *Pack on Back;* then followed *Martha* (1876); *The Vatard Sisters* (1879); *The Ménage* (1881); *Down There* (Là-bas) (1889).

HUYSUM, *hoy'sŭm,* JAN VAN: 1682-1749, Feb. 8; b. Amsterdam: celebrated Dutch painter of flowers and fruits. He acquired the rudiments of his art from his father, a landscape painter. Huysum surpassed all his predecessors in mellowness, purity, and delicacy of coloring; the exquisite disposition of his lights and shadows; and above all, in his miraculous rendering of dew-drops and the motions of insects. He died at Amsterdam. Huysum's masterpieces are in the galleries of Vienna, Munich, Dresden, and St. Petersburg.

HUZZA! int. *hûz-zâ'* [Ger. *hussa,* huzza: Dan. *hurra,* hurrah]: a shout of joy or approbation: V. to receive with approbation. HUZZA'ING, imp. HUZZAED', pp. *-zâd'.*

HWANG-HO, *whâng-hō',* or HOANG-HO, *ho-âng-hō',* or YELLOW RIVER: one of the principal rivers of China, about 2,400 m. in length, the area of its basin being not less than 700,000 sq.m. It rises in a marshy plain between the Bayan-kara and Kwanlun Mountains, in a lake called Ala-nor, lat. 35° 30′ n., long. 96° e. Its course is crooked: after it leaves Ala-nor, it turns first s. 30 m., then e. 160., then w. 120, winding about the gorges of the Kwanlun, then n.e. into the province of Kansuh; next it proceeds n. 430 m., till it is bent e. by Inshan, on the edge of the table-land, where it incloses within its great bend the country of the Ortous Mongols. At the Peh-ling it is deflected s., and for 500 m. it divides the provinces of Shanse and Shense. At the s.w. corner of Shanse, it receives its largest tributary, the Wei-ho, 400 m. in length; from this point the Yellow river flowed until recently e. to the ocean, 650 m. distant, lat. 34°. It is little used for navigation, Chinese vessels being unable to stem its impetuous current. In some parts of its e. course, it is above the great plain through which it passes. The embankments requisite for averting inundations are a source of never-ending expense to the government, and their yielding to floods a frequent cause of desolation to extensive districts of country. This wayward and turbulent stream is said to have shifted its course nine times in 2,500 years; notably, 1851-53, when it turned off near Kaifung-foo in a n.e. direction, discharging its waters into the rivers of Chih-le, which disembogue in the Gulf of Pehchele, the mountainous province and promontory of Shantung intervening between its former and its present mouth, a distance by coast-line of about 500 m. More recently, it was announced that the

old bed of the Yellow river, for more than 200 m. from its mouth, was a belt of sand, which, since 1853, has been, to use the Chinese term applied to it, 'as dry as dust.' The change seems to have been gradual. It has been suggested that earthquakes contributed to effect the phenomenon, another cause being neglect of the dikes by the imperial government. There is a bar with only five ft. of water across the new mouth of the Hwang-Ho. Its present channel is probably the same as in ancient times; for it has shifted its bed at different periods of Chinese history. About 170 m. of the upper course of the Hwang-Ho were explored for the first time by Prejevalsky 1880. The vast quantity of sediment conveyed to the sea by this river, giving it its color and name, is taken up in that part of its course which lies between the provinces of Shanse and Shense; above which its waters are remarkably clear. Hwang-Ho is held in great veneration by the Chinese.

HWEN T'SANG, or HIWEN T'SANG. See HIOUEN THSANG.

HYACINTH, n. *hī'ă-sĭnth* [F. *hyacinthe*—from L. *hyăcin'thus;* Gr. *hŭăkin'thos*]: in *anc. myth.*, a Spartan youth, beloved by Apollo, who was accidentally killed, and from whose blood the flower sprang; a beautiful flowering plant of many varieties; the blue iris, corn-flag, or gladiolus of the ancients; the genus of plants *Hyăcin'thŭs,* ord. *Lĭlĭăcĕæ* (see below): a precious stone of a violet color; a variety of zircon: there are brilliantly colored varieties. The name is given also to fine red Cinnamon-stone (q.v.), or Pyrope (q.v.); and sometimes to ferruginous quartz of blood-red color, which from its abundance at Compostella, Spain, is called *Hyacinth of Compostella.* HY'ACIN'THINE, a. *-sĭn'thĭn,* consisting of or resembling hyacinth.

HYACINTH, *hī'a-sĭnth* (*Hyacinthus*), or JACINTH, *jā'-sĭnth:* genus of plants of nat. ord. *Liliaceæ:* bulbous-rooted plants with corolla-like, bell-shaped, 6-cleft perianth, six stamens fixed in the tube of the perianth, and dry, capsular fruit. The *Oriental Hyacinth* (*H. orientalis*), one of the most favorite of florists' flowers, is a native of Asia Minor, Syria, and Persia. It is now naturalized in some parts of s. Europe. The original was an insignificant flower, scarcely recognizable in the superb and brilliant varieties developed by careful culture. It has broad linear leaves, and a scape with a raceme of many flowers pointing in all directions. The flowers in cultivation exhibit great variety of color, chiefly blue, purple, and white. They are very beautiful and very fragrant; the fragrance is strongest about or after 11 o'clock at night. Among cultivated hyacinths are many with double flowers. The hyacinth has been cultivated from a remote period (before 1597), but about the beginning of the 18th c. double-flowered ones appeared, and the hyacinth attained almost the first place as a florists' flower. At

present the single-flowered sorts are again preferred. Great attention was bestowed on the production of new varieties, and enormous prices were given for bulbs of some of them. A price equal to $1,000 was sometimes paid for a single bulb. The principal seat of the cultivation of hyacinths was and still is at Haarlem. At present, however, the price is seldom more than $50 for the finest new variety of hyacinth, but though the trade is considered as now much depressed, the Haarlem gardeners still sell bulbs to the value of $10,000 to $15,000 yearly. Hyacinth bulbs, planted in pots, readily produce beautiful flowers, and flowers almost equally beautiful are obtained—for one year, however, only—by placing them in water in hyacinth *glasses*, in which they form a favorite ornament of apartments in winter and early spring. The cultivation of the hyacinth in the open ground is much more difficult. New varieties are raised from seed. Several other species of hyacinth are natives of s Europe, Africa, etc. The earliest variety is the white Roman hyacinth, small-flowered but sweet.—The GRAPE-HYACINTH and GLOBE-HYACINTH, frequently cultivated as garden flowers, are now preferred to the genus *Muscari*. A common British plant, growing in woods and copses, with beautiful blue flowers very like those of the Oriental Hyacinth, but all drooping to one side (*H. non-scriptus*, also known as *Scilla nutans*, *Endymion nutans*, and *Agraphis nutans*), is sometimes called the WILD HYACINTH, and sometimes the BLUE-BELL. The bulbs have been used for making starch.

HYACINTHE, *e-â-săngt'*, FATHER (monastic name of CHARLES LOYSON): b. Orleans, France, 1827, Mar. 10. He studied at St. Sulpice, and after becoming a Rom. Cath. priest, taught philosophy and theology at Avignon and Nantes. Subsequently entering the order of the Carmelites, he became known as a powerful preacher, and gathered crowded and enthusiastic audiences of all ranks of society to the Madeleine and Notre Dame in Paris 1865. Almost as remarkable as his eloquence was the boldness with which he denounced existing abuses in the church; and the Abp. Darboy defended him against the accusations of the Jesuits till in 1869 the general of his order imposed silence on him. Hyacinthe replied by a letter, in which he called for a thorough reform of the church, and was excommunicated. Relieved from monastic vows by the pope, he became a secular priest under the name of the Abbé Loyson. He protested vigorously against the Infallibility Dogma; but though he attended the 'Old Catholic' Congress at Munich, and on visits to the United States and England fraternized with Protestants, he always declared his intention to remain in the Catholic Church, trying to obtain reforms, such as the liberty of marriage for the clergy. On retiring from the pulpit of the Madeleine 1869, he came to the United States, spending a few weeks with a Congl. pastor in

northern Conn., and visiting friends elsewhere; and 1872, Sep. 2, he married in London, Mrs. Emily Jane Meriman, widow of an American gentleman. In 1873 he was chosen curé of a congregation of Liberal Catholics at Geneva, but soon left them, finding them to be 'neither liberal in politics nor Catholic in religion.' He has published a number of sermons and lectures, and has a congregation in Paris—the 'Gallican Church,' of which he became rector 1881.

HYADES, n. plu. *hī'ă-dēz*, or HYADS, n. plu. *hī'ădz* [L. *hyădēs*—from Gr. *hŭădĕs*, the rainers—from *hŭō*, I rain]: a cluster of five (some say seven) stars in the Bull's face in the constellation *Taurus*, the rising of which with the sun was considered by the ancients as marking the beginning of the rainy season. In *myth.*, these were said to be daughters of Atlas, who had been translated to the sky.

HYÆNA. See HYENA.

HY'A-HY'A. See COW TREE.

HYALINE, a. *hī'ă-lĭn* [Gr. *hŭălŏs*, glass]: glassy, consisting of or resembling glass; in *bot.*, transparent or nearly colorless, applied to the part where the cell-nucleus appears; in *med.*, clear, and of a slight consistence like a jelly. HYALEA, genus of mollusks belonging to the class *Pteropoda* (q.v.), having shells of a beautiful transparent glassiness. HY'ALITE, n. *-līt* [Gr. *lithos*, a stone]: a variety of opal. HYAL'OGRAPH, n. *-ăl'o-grăf*, instrument for tracing a design on a transparent surface. HYALOG'RAPHY, n. *-lŏg'ra-fĭ*, art of writing or engraving on glass. HY'ALOID, a. *-loyd* [Gr. *eidos*, likeness]: like glass; transparent. HY'ALOSID'ERITE, n. *-sĭd'ėr-īt* [Gr. *sidērŏs*, iron]: a brown or yellow-colored very ferruginous and metallic-looking mineral—a variety of olivine.

HYALONEMA, n. *hī-a-lō-nē'ma* [prefix *hyalo-*; Gr. *nēma*, yarn]: in *zool.*, glass-rope; typical genus of *Hyalonemidæ*, family of siliceous sponges; in *paleon.*, the family occurs from the Silurian times till now.

HYAMS, HENRY MICHAEL, American lawyer and politician: b. Charleston, S. C., 1805; d. 1875. In 1828 he went to New Orleans, studied law, and after 15 years of country practice in Alexandria, La., resumed his residence in New Orleans, where his investments in landed property made him wealthy. In politics he was originally an old line whig, but on the outbreak of know-nothingism joined the democratic party. In 1855 he was elected to the state senate; in 1859 he was chosen lieutenant-governor; the first Israelite to hold such an honor in the United States. He was devoted to the southern cause, sent his sons to fight in the Confederate army, and after the war found his large fortune vanished. Prepared to begin life anew, he resumed the practice of law until his death.

HYATT, ALPHEUS, American naturalist: b. Washington 1838, April 5; d. Cambridge, Mass., 1902, Jan. 15. He was graduated from the Lawrence Scientific School at Harvard in 1862, then entered the army and served during the war in the 47th Massachusetts regiment, being promoted to the rank of captain. After leaving the army, he resumed his studies under the instruction of Agassiz, and later studied abroad. In 1867 he went to Salem, where he was one of the founders of the Peabody Academy of Sciences and one of the curators of the Essex Institute. In 1870 he was made custodian of the collections of the Boston Society of Natural History, becoming curator in 1881. He was also connected with Boston University, was manager of the Teacher's School of Science, had charge of a laboratory of natural history founded by the Women's Educational Society at Annisquam, and was for several years professor of zoology and paleontology at the Massachusetts Institute of Technology. In his later life he had charge of invertebrate fossils in the Museum of Comparative Zoology at Cambridge. He was a member of the American Academy of Arts and Sciences, of the National Academy of Sciences, and of the American Society of Naturalists. He was one of the founders of the last mentioned society and its first president (1883); he was also one of the founders and editors of the *American Naturalist.*

HYBERNATE, HYBERNATION. See HIBERNATE.

HYBERNIA, n. *hī-bĕr'nĭ-a* [L. *hibernus, hybernus,* pertaining to winter]: typical genus of the *Hybernidæ,* a family of moths, group *Geometrina.*

HYBODUS, n. *hī'bō-dŭs* [Gr. *hubos,* curved, humped; *odous* or *odonta,* a tooth]: genus of fossil shark-like fish, whose teeth and osseous fin-rays are found in all the Secondary rocks from the Trias to the Chalk inclusive. The genus, with the small family of HYBODONTS to which it belongs, occupies a place between the Cestracionts, with their pavement of flat crushing teeth, and the sharks with their sharp-pointed cutting teeth. The teeth of the Hybodonts are conical, but broad and blunt; from the body of the tooth rises a large central cone, and several small lateral ones, decreasing in size as they recede from the principal cone. The enamel is strongly marked by longitudinal grooves and folds. The osseous rays of the dorsal fins are the only other preserved portions of these fossils. Like the Port Jackson shark, the Hybodus had each of the two dorsal fins furnished with a large and strong spine, one-third of whose length was buried in the flesh. Nearly 50 species of this genus have been described.

HYBRID, n. *hī'brĭd* [F. *hybride*—From L. *hybrĭdă,* a mongrel, a hybrid—from Gr. *hubris,* a wanton act, an outrage]: a mongrel; a mule; an animal or plant, the produce of different kinds or species: ADJ. having the origin or character of a hybrid; applied to words formed

of elements derived from different languages; heterogeneous or mixed. HY'BRIDOUS, a. *-ŭs*, produced from the mixture of two species. HY'BRIDISM, n. *-ĭzm*, or HYBRID'ITY, n. *-brĭd'ĭ-tĭ*, character, state, or condition of a hybrid. HY'BRIDIZE, v. *-īz*, to make or become hybrid. HY'BRIDI'ZING, imp. HY'BRIDIZED, pp. *-īzd*. HY'BRIDIZA'TION, n. *-ī-zā'shŭn*, the act of rendering hybrid; also HY'BRIDI'ZING, n. *-ī'zĭng*.

HY'BRID: term applied by naturalists to the offspring of different but generally nearly allied species of animals and plants; distinguished from the word *mongrel*, which is applied to the offspring of different varieties of the same species.

M. Broca, whose memoir on Hybridity of Animals is the most complete that has appeared, remarks that this condition may be (1) natural, (2) excited (*provoquée*), or (3) artificial. The first variety is such as occurs spontaneously among animals in their wild state; the second includes those cases in which domesticated animals, which would not naturally cross with one another, do so under the influence of man, and in opposition to their natural instincts; while the third variety is due to the artificial admixture of the male and female generative elements, and as far as is yet known occurs only in fishes, and in the vegetable kingdom. The second variety is by far the most common and the most important.

When the male of the species A can impregnate the female of the species B, it may happen that the process can be inverted, and that the male B can impregnate the female A. In other cases, while the male A can readily impregnate the female B, the male B cannot impregnate the female A. In the first case, the hybridity is termed *bilateral;* in the second, *unilateral.* The former is rare, and even when it does occur, the cross in one direction is more common and more productive than in the other. Thus, the ordinary mule, the offspring of the male ass and the mare, is much more readily obtained, and, physiologically, is less imperfect than the corresponding animal, the hinny, which occasionally results from the union of the stallion and female ass (see MULE; HINNY). Domestic sheep and goats afford an example of the latter (unilateral) kind of hybridity. The union of the he-goat and the ewe is frequently productive, while the union of the ram with the she-goat is always unproductive.

In the present state of our knowledge, it is impossible to predicate in what cases the crossing of different species will be productive, and in what cases it will be barren. While some closely allied species do not admit of a cross, other species, far more removed from one another, not only yield hybrids, but even fruitful hybrids. There is, however, a limit, beyond which the chance of offspring becomes reduced to zero, and, according to Broca: 'If the crossing of animals of different genera is now an incontestable fact, there is no authentic evidence

that offspring has resulted from the crossing of animals of different orders.' Cases have been referred to, as showing that animals of different orders may cross, but none of them are established. The strongest apparent case of hybridity between different orders is that of the *Jumarts,* which were said to result from the union of the bull and the mare, or of the stallion and the cow. These jumarts were believed in from the time of Columella to that of Buffon, who fully investigated the subject, and found that they were merely hinnies—offspring of the stallion and the she-ass. Among mammals, hybrids have been obtained between the different species of the genus *Equus.* So far as experiments go, the horse, the ass, the zebra, the quagga, etc., breed freely *inter se,* but the degrees of fertility among their offspring have not been fully determined. The dog has been made to breed with the wolf and the fox, the lion with the tiger, the he-goat with the female sheep, the ram with the female roe-deer (*Cervus Capreolus*), and the hare with the rabbit.

Among birds, hybridity is not uncommon. The swan will breed with the goose, the grouse with the blackcock, the pheasant with the common fowl, the goldfinch with the canary, etc. Among reptiles, hybrid offspring has been observed between the toad and the frog. Among fishes, hybrids have been obtained by artificial impregnation between different species of the genus *Cyprinus.*

Many hybrids have no propagative power, while in others it is so far limited as to admit only of reversion to the original specific form. When a hybrid possesses generative power, it breeds more readily with an individual of one of its parent stocks than with another hybrid like itself. The most remarkable example on record of generative power in hybrids is afforded by the experiments of M. Roux of Angoulême, who found that he could cross hares and rabbits to any extent; and who by breeding *leporides,* established a new and lucrative department in agriculture.

Experiments on the hybridization of plants have been very far from confirming the hybrid origin of forms apparently intermediate between other species, and which were once regarded as probably hybrids produced in a state of nature. The interference of man is usually necessary to effect an intermixture, and in many cases in which it has been found possible, it is by no means easy. The predilection for pollen of the same kind appears very strong; and if pollen, both of the same and of another kind, is applied to the stigma of a flower, the result is the same as if its own pollen had been there alone. The hybridizer, therefore, must cut away the stamens of the flower of which the pistil is to be impregnated, and carefully prevent all access of pollen other than that which he brings to it. Even with these precautions, it is found impossible to produce hybrids

between some plants of the same family, and not very dissimilar.

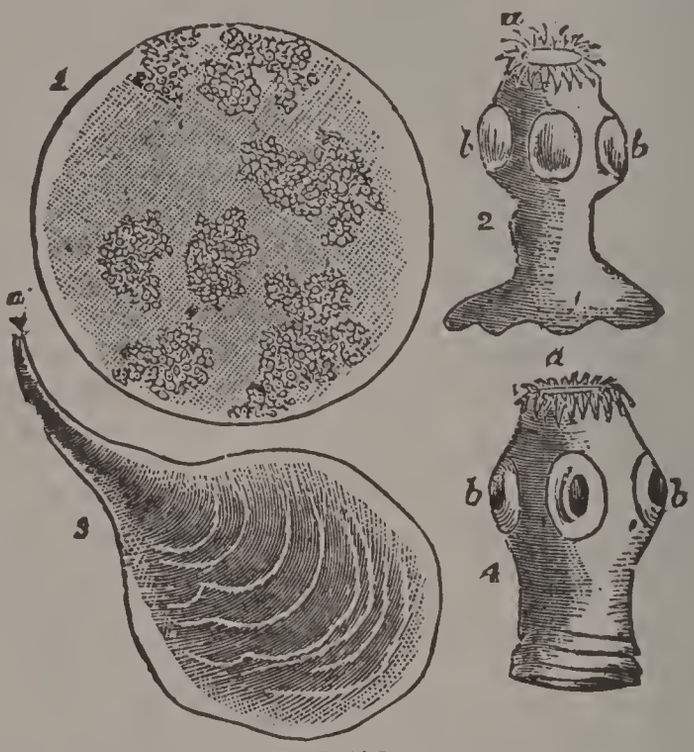
Hybrid plants are said to partake generally of the characters of the male more than of the female parent. It is more certain that valuable results are often obtained as to size and abundance of fruit, brilliancy of flowers, hardiness, and other qualities. The question of the continued fertility of true hybrids is one having most important relations to the great questions concerning species. Some assert that neither among animals nor among plants are hybrids fertile for more than one or two generations, if kept by themselves; though they are readily fertile with either of the parent species to which they become again assimilated. But this opinion is controverted, and the question must be decided by observation of facts, in judging of which, however, questions of no little difficulty must often arise as to what are and what are not different species.

The subject of the hybridization of plants was first investigated, and with great care and very numerous experiments, by Kölreuter, in the end of the 18th c., and has been more recently studied with much attention by Dean Herbert of Manchester, Van Mons, and particularly Gaertner.

HYDAS'PES. See JHELUM.

HYDATIDS, n. plu. *hī'dă-tĭdz*, or HYDATIDES, n. plu. *hī-dăt'ĭ-dēz* [Gr. *hūdătis* or *hudătĭda*, a vesicle—from *hudōr*, water]: term indefinitely applied to several distinct objects of a vesicular or cyst-like character, found in the bodies of men and certain mammals. True hydatids were formerly regarded as cystic Entozoa (see ENTOZOON), such as Cysticerus, Cœnurus, and Echinococcus; but all these forms are now known to be larval stages of Tænia or Tape-worm (q.v.). These hydatids may occur in almost any part of the body, and they have been observed in man, the ape, the ox, the sheep, the horse, the camel, the pig, the kangaroo, and some other vegetable feeders, though not in purely carnivorous animals or in the rodents. They are generally inclosed in an external sac attached to the tissue of the organ in which it is situated, and which is frequently common to many hydatids, each of which has a distinct envelope. The fluid in the interior of the hydatid itself is almost always colorless and limpid, but the fluid in the common cyst in which the hydatids float is often of a yellow color. The *Cœnurus cerebralis* is found in the brain of various ruminants, and gives rise to the disease in sheep known as 'the staggers.' When the hydatid occurs in the fourth ventricle, the animal, instead of turning round and round in one direction, springs in the air, and this variety of the affection is hence distinguished by German veterinarians as *das Springen*. Whenever any of the above forms of hydatids are swallowed by man or the lower animals, they may proceed, under favorable circumstances,

to be developed into the higher stages of tape-worm. Two species of Echinococcus are usually noticed, namely, the *E. hominis,* occasionally found in the brain and abdomen of man, and the *E. veterinorum,* of common occurrence in various parts of the body of the pig, and several other mammals, but it is not certain that they are really distinct. These echinococci do not become developed into tape-worms unless they reach the intestinal canal of some animal, by being taken as food; and in ordinary cases of hydatids, consisting of echinococci, the cysts and their contents undergo a kind of degeneration,



Hydatids:
Copied from Rymer Jones's *Animal Kingdom.*
1, Cœnurus cerebralis, natural size: 2, one head magnified; *a,* oval circlet of hooks; *b,* suckers; 3, Cysticercus tenuicollis, natural size; 4, head magnified; *a,* circlet of hooks; *b,* suckers.

becoming in some cases converted into fatty or calcareous matter, while in other cases the contents become granular, the peculiar hooklets (see TAPE-WORM) which occur in them, and which remain unaltered for a long time, revealing their true origin. The so-called acephalocyst, or common globular hydatid, which sometimes attains the size of a child's head, is probably a degenerated or abnormally developed echinococcus.—Hydatids sometimes occasion so little inconvenience that they may be discovered after death in the bodies of persons who had not suspected any disease in the organ in which they are found. On other occasions, they grow rapidly, and cause so much irritation that suppuration is excited in or around the common sac, which may burst externally or into a mucous canal or a serous cavity. In the first or second case, the hydatids will be discharged, and recovery may take place; in the third case, fatal inflammation will

ensue. Little can be done for the treatment of this affection, except that occasionally, if the cyst is near the surface, it may be carefully punctured. For means of prevention, see TAPE-WORM.

False hydatids are simply serous cysts, occurring either alone or in clusters, whose mode of origin is not understood. Structures of this kind, on a small scale, are common in the choroid plexus of the brain; while on a large scale they are found containing the fluid in ovarian dropsy. These false hydatids are of comparatively common occurrence in the uterus also, which they may distend to such a size as to simulate pregnancy.

HYDATINA, n. *hī-da-tī'na* [Gr. *hudatis,* a watery vesicle]: in *zool.,* typical genus of the *Hydatinœa,* a family of *Rotatoria,* established by Ehrenberg.

HYDATOID, a. *hī'da-toyd* [Gr. *hudōr,* water; *eidos,* appearance, likeness]: resembling water in quality, nature, appearance, or consistency; in *anat.,* the membrane surrounding the aqueous humor of the eye or that humor itself.

HYDE, *hīd:* important manufacturing town of Cheshire, England, seven m. e.s.e. of Manchester, and about the same distance s.e. of Oldham. Until a comparatively recent period, it was a mere village; but since the extension of the cotton-trade at the beginning of this century, it has rapidly increased. Besides the numerous cotton-factories, iron, water, and print works are carried on. Coal abounds in the neighborhood. The district in which Hyde is situated is densely peopled, and is furnished with abundant means of communication, by railway and canal, with all the important towns in the vicinity. Pop. 31,682.

HYDE, WILLIAM DEWITT, American college president: b. Winchendon, Mass., 1858, Sep. 23. He was graduated from Phillips Exeter Academy in 1875, from Harvard in 1879, and studied theology at Union and Andover. After completing his theological studies he was pastor for a time at Paterson, N. J. In 1885 he became president of Bowdoin College; at that time he was the youngest college president in the United States, and was not widely known. He has written *Practical Ethics* (1892); *Social Theology* (1895); *Practical Idealism* (1897); *The Evolution of a College Student* (1898); *God's Education of Man* (1899); *The Cult of Optimism* (1900).

HYDE, EDWARD. See CLARENDON, EARL OF.

HYDE PARK, a former township of Cook co., Ill., but now incorporated in the city of Chicago; comprising the former towns of South Chicago, Pullman, and about 40 other small towns and villages. It contains numerous churches, public schools, post offices, electric lights, gas, water, sewage works, numerous large and varied manufactures, places of amusement, public works, extensive park system, etc., and is site of World's Columbian Exposition of 1893 and of Univ. of Chicago. Has railroad and

street car communication with centre of Chicago and with adjoining towns and villages.

HYDE PARK: town, in H. P. tp., Norfolk co., Mass.; on the Neponset river and the New York, New Haven & Hartford railroad; 8 m. s.w. of Boston. It contains several churches, graded schools, public library, savings bank, weekly newspaper, manufactories of cotton, curled hair, machinery, paper and woolen goods, and many residences of Boston business men. Pop. tp. (1910) 15,507.

HYDE PARK: noble enclosure of nearly 400 acres, extending from the w. extremity of London to Kensington Gardens; named from having been the manor of the hyde belonging to the Abbey of Westminster. It became the property of the crown on the dissolution of the monasteries, in the reign of Henry VIII. A canal, or sheet of water, called the Serpentine, though in the form of a parallelogram, was made in Hyde Park 1730-33, by order of Queen Caroline. At the e. end of it is an artificial waterfall; constructed 1817. On the s. side are the barracks of the Lifeguards. It was in Hyde Park that the great International Exhibition of 1851 was held, in a Crystal Palace erected specially for the occasion. It is not recorded at what time the public began to have free admission to Hyde Park. But Ben Jonson speaks of the show of coaches which it presented in his time; and we know that it was constantly resorted to on the morning of May-day for the sports comprehended under the term Maying. Till the middle of the 17th c. there was a part of it which contained deer. About that time it began to be a place for races and military reviews. It was resorted to also for duels. After the Restoration, it appears to have become the favorite promenade, which it has since continued to be. It has undergone many changes of boundary and division; a large part of Kensington Gardens has been taken from it, also an angle at the s.e. corner on which Apsley House now stands.

HYDERABAD, *hī-dér-a-bâd′:* state in s. India, including Berar; lat. 15° 10′—21° 41′ n., long. 74° 40′—81° 31′ e.; about 475 m. long and wide; area of Berar, 17,728 sq.m.; of the Nizam's territories, 80,000 sq.m.; whole state about 98,000 sq.m.; bounded n. and n.e. by the Central Provinces, s. and s.e. by territory subject to the Madras Presidency, and w. by territory subject to the Bombay Presidency; pop. (1901) 11,174,897. Generally, soil is fertile, yielding valuable crops of rice, wheat, maize, oil-seeds, fruits and garden produce, cotton, indigo, sugar-cane, and tobacco. Silk, lace, gums, oils, raw and tanned hides, the famous Deccan-bred horses, and metal ware, are largely exported, and salt, grain, timber, and European piece-goods imported. There are several railroads in the state, and the three principal ones pass through the cap., Hyderabad City. The Nizam is the principal Mohammedan ruler in India.

HYDERABAD, *hī-dėr-a-bâd′* (*Haidarábád*): city, cap. of the Nizam's dominions (q.v.) or Haiderabad state, in central s. India; on the right bank of the Musi, lat. 17° 22′ n., and long. 78° 30′ e.; 1,800 ft. above sea level. At the first census (1901) the pop. was found to be 123,675, and with suburbs 446,291. On the opposite side of the river is the British Residency, the stream being here bridged by nine spacious arches of squared granite. Besides these erections and the palace of the native sovereigns, is the principal mosque, fashioned after the model of the Kaaba at Mecca; while at the meeting of the four principal streets of the city rises another remarkable edifice, with four minarets resting on four connected arches, on which run the four converging thoroughfares. The neighborhood abounds with huge tanks, one 3 m. long, 2 wide, and another said to be much larger (see SECUNDERABAD). For the Assigned Districts of Hyderabad see BERAR.

HYDERABAD′ (Haidarabad): chief city of Sinde, India, and cap. of a dist. four m. e. of the left bank of the Indus. Pop. (1891) 57,790. The place is famous for manufacture of silks, gold-work, pottery, and arms of various kinds, such as matchlocks, swords, spears, and shields. As against a native force, it is strong, occupying a somewhat steep height, and having a rampart flanked by round towers. The *district* of Hyderabad in Sinde, is a vast alluvial plain, 216 m. long, 48 m. broad, e. of the river Indus; 9,053 sq.m. Pop. abt. 725,000, of which 560,000 Mohammedans, 120,000 Hindus, 45,000 of other creeds and tribes.

HYDER ALI, *hī′dėr â′lē*, or HAIDAR 'ALI: abt. 1702-1782, Dec.: one of the greatest Mohammedan princes of India. His father, who was a gen. of the Rajah of Mysore, afterward obtained Bangalore in fief, and both these honors descended to his son. Hyder Ali, 1759, dispossessed his master, allowing him, however, to retain his title, while he himself took that of *daïva* or regent. He then conquered Calicut, Bednor, Onor, Cananor, and other neighboring states; and in 1766, his dominions included more than 84,000 sq.m. He waged two wars against the British, in the first of which he was completely successful, and dictated terms of peace under the walls of Madras; but died suddenly at Chittore before the termination of the second, in which he was aided by the French. He also joined in a native confederacy for the expulsion of the British from India. He, besides, withheld the customary tribute from the Mahrattas (q.v.), and waged successful war against them. In his wars he showed great resolution and perseverance. Hyder Ali was remarkable among Asiatic princes for the mildness of his character and government, and was much beloved by his people. He promoted agriculture, commerce, and the arts, and protected all religions, requiring only submis-

sion to his laws. His son and successor was Tippoo Sahib (q.v.).

HYDNORA, *hĭd-nōr'a:* genus of plants of nat. ord. *Rhizanthacea. H. Africana* is a native of s. Africa, where it is called *Jackal's Kost.* It is a parasite chiefly on the roots of large succulent spurges, and is a plant of most extraordinary appearance and structure, resembling a fungus rather than a phanerogamous plant. Its flowers and fruit are entirely concealed in its interior. It has a smell like that of a fungus, or of decaying roast-beef. The s. African savages roast and eat it.

HYDNUM, *hĭd'nŭm:* genus of fungi (*Hymenomycetes*), having the under side of the *pileus* covered with soft spines which bear the spores. The species are numerous. *H. repandum* is common in parts of Europe, and much used as an esculent in France, Italy, and Germany. It grows on the ground, chiefly in pine and oak woods, either solitary, or in clusters or rings.

HYDR, *hī'dr,* and HYDRO, *hī'drō* [Gr. *hudōr,* water]: a common prefix, in scientific terms, denoting the presence, action, or quality of water; also, in certain chemical terms, denoting the presence of *hydrogen.*

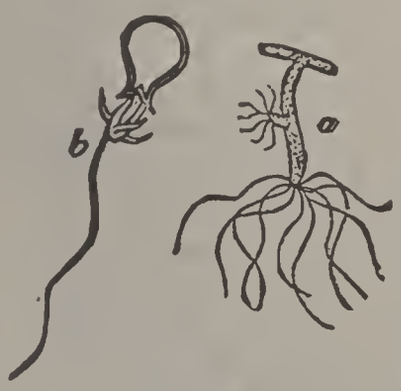
HYDRA, *hē'drâ* (sometimes Sidra or Idra or Nidero): island of Greece, off the e. shore of the Peloponnesus (now the Morea), about 5 m. from the coast of the dept. of Argolis and Corinth. It is about 13 m. long, 3 m. broad; 38 sq.m. The shores are rocky and steep, and the interior, rising to about 1,800 ft., is destitute of vegetation and of water. On the n.w. coast is the town and seaport of Hydra, the white, flat-roofed houses of which, ascending from the harbor, climb the side of a hill. The streets, owing to the irregularity of the site, are steep and uneven, but remarkably clean. This town, the only one in the island, is one of the most beautiful in Greece. The people are employed chiefly in cotton and silk weaving, in tanning, and in commerce.

The island of Hydra was uninhabited in ancient times. The nucleus of the town was formed by a few fishermen and peasants, who, suffering from the oppression of the Turks, crossed over from the neighboring mainland, and were followed by crowds from Albania, Argolis and Attica, in the 15th and 16th c. In the Grecian war of independence, the Hydriotes took a most active part; and none were more liberal in contributions to the patriotic cause. In 1825, the pop. was estimated at 40,000, and about that time the islanders were considered the richest in the archipelago. They possessed exclusively the carrying trade of the Black sea and the Mediterranean, and traded to England, the Baltic, and even to the United States. Since the revolution, however, more accessible ports have risen to be the centres of Greek commerce, and Hydra has considerably declined. Pop. 11,684.

HYDRA, n. *hī'drā* [L. *hydra;* Gr. *hūdrā,* the hydra, a water-snake—from Gr. *hūdōr,* water]: a water-snake. In

anc. myth. the Hydra was a fabulous serpent-monster, said to have inhabited the marshes of Lernæa, in Argolis, not far from the sea coast. Accounts vary as to its origin and appearance. Some make it the issue of Styx and the Titan Pallas; others, of Echidna and Typhon. It is represented as having many heads, which immediately grew up again as often as they were cut off, and, according to some, doubling in number. The original number generally ranged from seven to nine, though Simonides gives it 50, and certain historians a hundred, and even more. Its mouths, as numerous as its heads, discharged a subtle and deadly venom. The destruction of this reptile was one of the 12 labors of Hercules (q.v.). HYDRA-HEADED: having as many heads as the hydra, for when one head was struck off two at once sprang up in its place; denoting a difficulty or misfortune which apparently increases and strengthens the longer it is grappled with.

HY'DRA, or FRESH-WATER POLYP: type of the class HYDROZOA, which, with the ANTHOZOA, form the sub-kingdom *Cœlenterata.* See POLYPI; ZOOPHYTE. The hydra has a gelatinous, sub-cylindrical body, which, from its contractility, undergoes various alterations of form. One end expands into a disk or foot, which adheres to a leaf, twigs, etc.; while at the opposite end is a mouth, surrounded by a circlet of tentacles, five to twelve or more in number. These tentacles are exceedingly contractile, at one moment thrown out as long, delicate threads, at the next, drawn up into minute wart-like knobs. Numerous thread-cells project from their surface, the larger ones possessing a sheath and three recurved darts or barbs, and terminating in a long and extremely slender filament. The mouth leads into a capacious cavity throughout the whole length of the animal, which, exclusive of its tentacles, seldom exceeds three-fourths of an inch. On minutely examining the hydra, or any member of the class Hydrozoa, the body is found to be composed of two membranes, an ectoderm and an endoderm, the former constituting the outer layer of the animal, and having one side always in contact with the water, while the other side is in close contact with the endoderm, whose free surface forms the lining of the great internal cavity. The food of the hydra consists of such minute living organisms as come within the reach of its tentacles, and by these apparently fragile threads, which the animal projects like



Hydra:

a, Hydra Vulgaris, attached to a piece of stick—a young polyp is sprouting from the side of the parent animal; *b,* one of the larger thread-cells, with its three recurved barbs.

a lasso, crustaceans, worms, etc., are seized, which would be deemed at first sight superior to their captor in strength and activity. The tentacles appear, however, to possess, through the action of the thread-cells, a powerful benumbing or paralyzing influence, for it has been observed that soft-bodied animals which have succeeded in escaping from the grasp of the hydra frequently die very soon. The prey, when mastered, often still alive, is thrust into the internal cavity, where the nutritive parts are absorbed by the hydra, while the indigestible portions are expelled through the mouth.

Although the hydra is found usually adhering by its circular foot or disk to submerged leaves, twigs, etc., it is not permanently fixed. It often moves on surfaces under water somewhat after the manner of a leech, both ends taking a part in the movement, and occasionally the disk is protruded above the water, and thus acts as a float.

Sometimes, especially in the autumn, true reproductive organs may be observed, both male and female organs usually on the same animal. Propagation by gemmation is, however, the most common mode of increase. Minute tubercles appear on the body of the parent animal, which, as they increase in size, gradually resemble it; becoming perforated at their free extremity, and tentacles gradually being formed. The pedicle by which they originate by degrees becomes thinner, and finally gives way, leaving the young hydra perfectly independent. One of the most remarkable points in the history of this animal is its power of being multiplied by mechanical division. If a hydra be cut into two, or even more, pieces, every one will, in time, assume the form and functions of the original animal.

Several species of hydra, such as *H. viridis, H. vulgaris, H. fusca,* etc., have been described, which differ in size, color, etc. When living hydræ are removed from the water they appear like minute specks of jelly, which quickly recover their true form on being restored to their proper element.

HYDRACHNA, n. *hī-drăk'na* [prefix *hydr-;* Gr. *achnē,* anything shaved off; froth, chaff]: typical genus of the family *Hydrachnidæ,* water-mites, a family of Acarina. They swim by means of the fringes on their legs.

HYDRACID, n. *hī'drăs'ĭd* [Gr. *hudōr,* water; Eng. *acid*]: hydrogen acid, acid containing hydrogen with another element, but without oxygen; e. g., hydrochloric acid: the name was given to acids in which the acidifying principle was supposed to be hydrogen: see ACIDS. The division of acids into *oxyacids* and *hydracids* belongs rather to a past than to the present state of chemistry.

HYDRAFORM, a. *hī'drā-fawrm* [L. *hydra,* a water-snake; *forma,* shape]: resembling the common fresh-water polyp in form.

HYDRAGOGUE, n. *hī'drā-gŏg* [Gr. *hudōr,* water; *agō,*

I lead]: active purgative producing a great flux from the intestinal membrane, consequently occasioning very watery stools. Hydragogues are of great use in some varieties of dropsy, being the most effectual means of diminishing the liquid poured into the cellular tissue and serous cavities of the body. Jalap (especially when combined with bitartrate of potash) and elaterium, a medicine which, from its extreme power, must be given only under professional advice in very small doses (one-eighth to one-third of a grain), and with great caution, are perhaps the best examples of this class of purgatives.

HYDRANGEA, n. *hī-drān'jē-a* [Gr. *hudōr*, water; *anggei'on*, a vessel, a capsule]: genus of plants of nat. ord. *Hydrangeaceæ*, or *Hydrangeæ*, which many botanists make a sub-order of *Saxifrageæ;* distinguished by having 4-6 petals, 8-12 or many stamens, a more or less inferior ovary, and 2-5 styles. *Hydrangeaceæ* are shrubs with opposite, or sometimes whorled leaves, destitute of stipules. In the genus hydrangea the flowers are in cymes, the exterior flowers sterile and dilated. More than 30 species are known, chiefly natives of the s. parts of N. America, and of China and Japan. The species popularly known as the HYDRANGEA (*H. hortensia*), is a native of China and Japan, and has long been in cultivation there as an ornamental plant. It was introduced into Britain by Sir Joseph Banks 1788, and speedily became popular, being readily propagated by layers and cuttings, as a favorite greenhouse plant, and frequent in cottage windows. In s. England it endures the open air. It seems almost impossible to water it too freely; a large plant has been known to receive with advantage 100 gallons of water daily; and in favorable circumstances it becomes a magnificent shrub. A plant in Devonshire, England, has had 1,000 large cymes of flowers expanded at once. The flowers, generally pink, are sometimes blue; the blue color is owing to peculiarities of soil. Peat and iron ore are said to be productive of the blue flowers. *H. Japonica*, introduced into Europe from Japan by Siebold, is remarkable for its very large cymes of flowers. *H. nivea* and *H. quercifolia*, American species, are frequent in flower-gardens in N. America. The finest American species is *H. paniculata grandiflora*, hardy, 8 or 10 ft. high, and very attractive in the shrubbery in late summer and early autumn. HYDRAN'GEA THUNBERGII, *thŭn-bér'jĭ-ī* [after *Thunberg*, a celebrated traveller and botanist]: a species whose leaves furnish a tea of a very high character, bearing the name Ama-tsja in Japan.

HYDRANT, n. *hī'drănt* [Gr. *hudōr*, water]: a pipe or spout for discharging water at a fire; a water-plug.

HYDRANTH, n. *hī'drănth* [Gr. *hudra*, a water-serpent; *anthos*, a flower]: the polypite or proper nutritive zooid of the Hydrozoa.

HYDRARGILLITE, n. *hī-drâr'jĭl-īt* [Gr. *hudōr*, water;

argil'los, clay]: a name given to the native phosphate of alumina, under the erroneous idea that it consisted of alumina and water.

HYDRARGYRUM, n. *hī-drâr'jĭ-rŭm* [Gr. *hudrar'gŭrŏs*, fluid silver—from *hudōr*, water; *argŭrŏs*, silver]: quicksilver or mercury. HYDRARGYRIA, n. *hī'drâr-jĭr'ĭ-ă*, one of the ill effects of mercury applied locally. HYDRARGYRIASIS, n. *hī-drâr'jĭ-rī'ă-sĭs*, a disease produced by the abuse of mercury.

HYDRASTIS, *hī-drăs'tĭs*, or WARNERIA, *wawr-nēr'ĭ-a:* genus of plants of nat. ord. *Ranunculaceæ*, allied to *Anemone*, but having flowers destitute of petals, and succulent or *baccate* fruit, collected into a head. The only known species, *H. Canadensis*, a perennial herbaceous plant, with tuberous roots, and head of fruit resembling a raspberry, is common in watery places in Canada, and among the Alleghanies, as far s. as Carolina. Its root is used for dyeing yellow, also in medicine as a tonic. YELLOW ROOT and ORANGE ROOT are its American names.

HYDRATE, n. *hī'drāt* [Gr. *hudōr*, water]: compound containing one or more molecules of the radical hydroxyl OH. In such compounds the water plays a part analogous to that of acids in the formation of salts. Thus sodium hydrate (NaOH) is formed by the combination of water with sodium oxid according to the equation $Na_2O+H_2O=2NaOH$; but it is quite a different substance from the oxid, Na_2O, and cannot be resolved into Na_2O and water by the action of heat alone. The large and important class of substances known as the alcohols are hydrates of organic radicals.

The term hydrate is also used in a less definite manner to signify any compound which contains water, or from which water can be expelled by the action of heat. Thus salts or minerals which are associated with water of crystallization are said to be "hydrated." HY'DRATED, a. *-drā-tĕd*, formed into a hydrate. HYDRA'TION, n. *shŭn*, the act or state of becoming a hydrate.

HYDRAULIC, a. *hī-drawl'ĭk* [L. *hydraul'ĭcŭs*—from Gr. *hudōr*, water; *aulos*, a pipe: F. *hydraulique*]: relating to the conveyance of water through pipes; worked by water; also HYDRAULICAL, a. *-ĭ-kăl*. HYDRAUL'ICS, n. plu. *-ĭks*, the science which treats of the application of the forces influencing the motions of fluids; the art of raising, conducting, and employing water for practical purposes: see HYDRODYNAMICS: HYDROSTATICS. HYDRAULIC CEMENTS, cements which have the property of becoming hard under water (see CEMENT): also HYDRAULIC LIMES (see CEMENT). HYDRAULIC FORGING, forging of metal by pressure instead of by hammering; it is done with the hydraulic press (q.v.), and the process resembles that of rolling.

HYDRAULIC CRANE: crane worked by water-pressure, recently brought into extensive use. Wherever a large number of cranes have to be worked near each other, water-pressure is by far the most manageable, economical, and convenient mode of working them.

Fig. 1 represents one of the simplest forms of hydraulic cranes, for loading goods in a railway station. It is entirely of iron, and consists of two upright cheeks, A, between which there is fixed a hydraulic ram (similar to that in the hydraulic press), occupying the lower half of the up

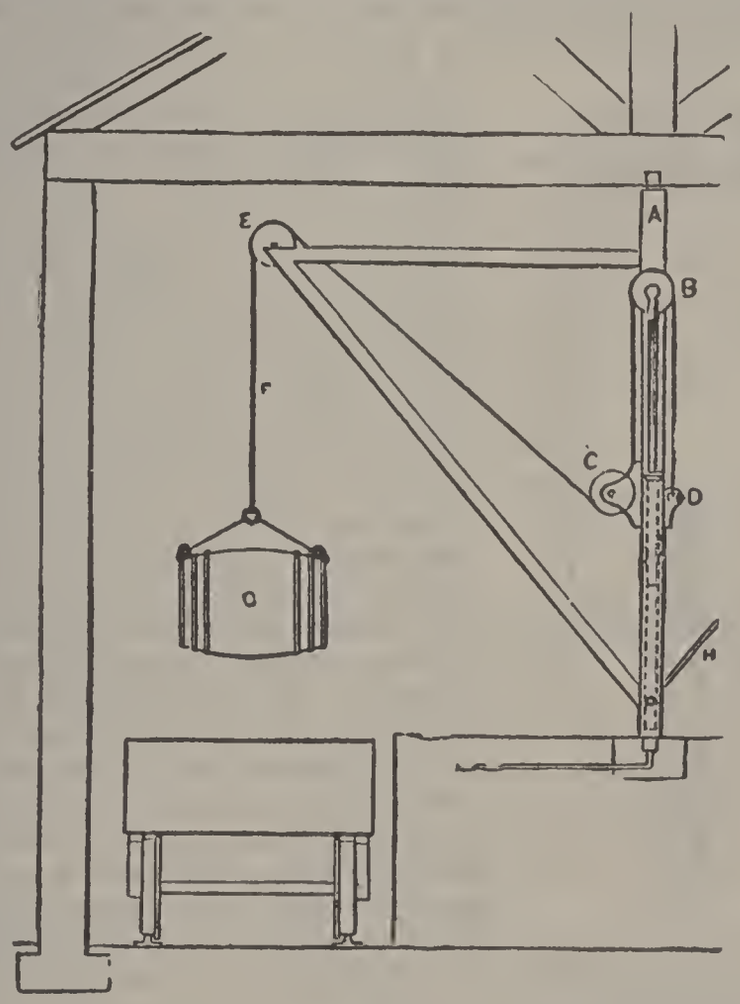


Fig. 1.

right frame A. The upper end of this ram carries a pulley B. A similar pulley is fixed to the upright frame at C. A chain is secured to a bracket, D, on the upright frame. This chain passes up over the pulley B, down and under the pulley C, and then over the pulley E, on the end of the jib of the crane. It is obvious that the rising and falling of the ram will cause the chain, F, to ascend and descend with its load G.

The ram is forced to ascend by the admission of water under great pressure by the handle H, which serves also to allow the water to flow out after it has done its work, and the ram descends by its own weight, allowing the chain, F, to run down with or without a load on it.

The pressure usually employed in working hydraulic cranes is greatly in excess of the pressure admissible in the

case of steam. Six or seven hundred pounds to the sq. inch is the usual working-pressure. This great pressure is produced by an arrangement called an accumulator, which consists of a large hydraulic ram of 16 or 18 inches in diameter, A, fig. 2, carrying a wrought-iron cylinder, B. This cylinder is filled with stones or gravel to the weight of 60 or 70 tons. A powerful horizontal steam-engine forces water into the cylinder C, and slowly raises the ram, A, with its enormous load. Pipes lead away from the cylinder to the cranes in the different parts of the station, and are thus supplied with water under the great pressure caused by the load B, fig. 2, forcing the ram A, fig. 2, into the cylinder. The load B, fig. 2, is constantly rising and falling a little as the cranes draw their supplies from the cylinder C, fig. 2. If the cranes were supplied direct from the force-pumps of the steam-engine, without the intervention of this accumulator, their action would be jerky and unsteady. The accumulator acts as a reservoir of power, and when it happens that a great number of cranes are drawing off water at the same moment, and in excess of what the engine force-pumps can supply, the ram descends, keeping up the while the full 700 lbs. pressure; and then, when the cranes are demanding less abundant supplies, the engine overtakes its work, and sends the ram up again. When it arrives at the top, it touches a lever communicating with the throttle-valve of the engine, and thus slows or stops the engine when the accumulator has mounted to its maximum height. The moment it begins to descend, the lever is relieved, the throttle-valve opens, and the engine goes on again with such speed as the work demands.

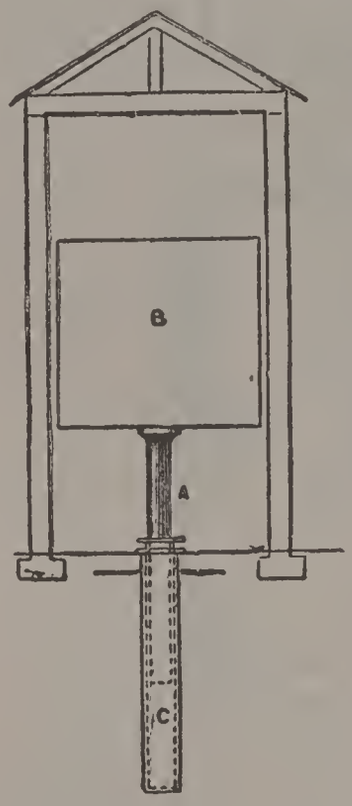


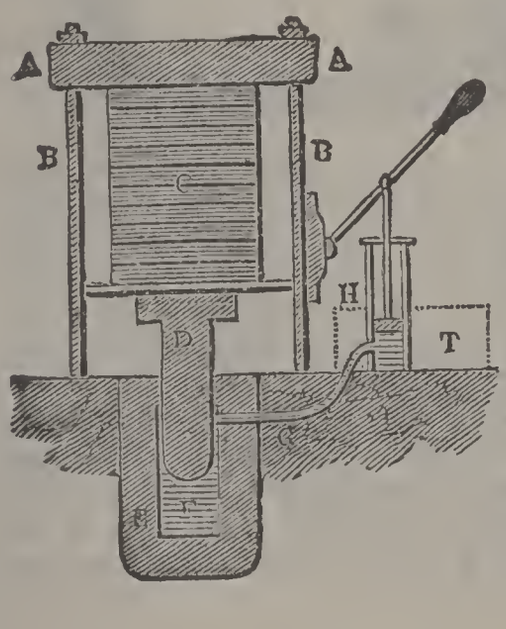
Fig. 2.

It is easily seen that when the pulley B, fig. 1, rises any given distance, the weight G will, at the same time, rise *double* that distance, because B raises a double length of chain; and, in the same way, by passing the chain twice, thrice, or any greater number of times over pulleys at B and C, fig. 1, the weight G, fig. 1, can be made to travel any number of times further than the ram. It is, in fact, the reverse action of a block and tackle. If the block is made to move, the *fall* will move further than the block in proportion to the number of times the rope passes over the sheaves. This kind of arrangement is adopted when it is desired to lift anything to a considerable height, such as grain to upper floors of a warehouse. There is, of course, a diminution in the weight that the machine can hoist, in proportion to the excess of travel of the load to that of the ram.

The hydraulic lifts, elevators, or ascending rooms, now in use in many high buildings, are constructed on the same plan as the accumulator, fig. 2. A cylinder, C, is sunk 60 or 70 ft. into the ground, thus admitting a ram, A, of nearly equal length to rise out of it, on a sufficient pressure of water being forced into it by a steam-engine. The elevator takes the place of the loaded cylinder B. Balance weights are attached to the elevator, to steady its movements, and to guard against any failure in the mechanism. A rope passing from bottom to top of the channel, through which the lift or elevator rises, affords to the person in the elevator the means of regulating its movements.

HYDRAUL'IC EN'GINES: engines worked by water-pressure, sometimes used where water under high pressure is obtainable. Their structure does not differ in any essential particular from that of a steam-engine, except that as the pressure under which they work is five to ten times greater than that of a steam-engine, they are much smaller. Mechanical power is obtained from flowing water by its weight, pressure, or impact, utilized in various forms of water wheels, turbines, hydraulic rams, and water pressure engines. In the water pressure engine the pressure of the water only is utilized to drive a piston in a cylinder. In some forms the action of the piston is reciprocating, and in others rotary. In all of them the actual amount of pressure expended is only that which is needed to impart motion to the fluid to follow the piston and escape from the cylinder, and, therefore, the greatest efficiency is obtained by making the piston as small as practicable and using a large pressure. The majority of them are of the reciprocating, low-speed type, and are particularly useful as secondary motors for operating the opening machinery of various forms of swing, draw, and lifting or rolling bridges, and in connection with cranes and various forms of hydraulic lifts.

HYDRAUL'IC JACK: form of hydraulic press (q.v.) applied instead of a jack-screw for raising heavy weights. An immense power may be developed for lifting houses, ships, etc.

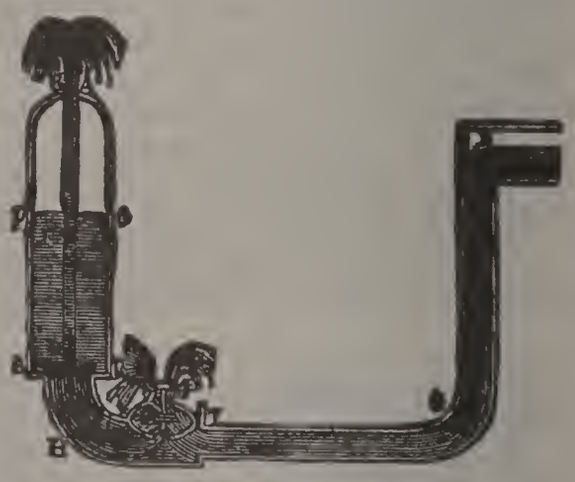


HYDRAUL'IC PRESS, called also BRAMAH'S PRESS, from its inventor: machine for producing and applying great pressure by water-power. It depends on the principle, that a pressure exerted on any part of the surface of a liquid is transmitted undiminished to all parts of the mass, and in all directions: see HYDROSTATICS. The annexed figure repre-

sents the essential parts of the machine, the details of construction being omitted. F is the cavity of a strong metal cylinder, E, into which the piston, D, passes water-tight through the top. A tube, G, leads from the cylinder to a force-pump, H; and by means of this, water is driven from the tank, T, into the cavity, F, so as to force the piston, D, upward. The piston supports a table on which are placed the bales, books, or other articles to be pressed; and the rising of the table presses them against the entablature, AA, which is fastened to the pillars, BB. The power of the press is readily calculated. Suppose that the pump has only one-thousandth of the area of D, and that, by means of its lever-handle, the piston of the pump is pressed down with a force of 500 pounds, the piston of the barrel will rise with a force of one thousand times 500 pounds, or more than 200 tons. The rise, however, will be slow in proportion to the power. The enormous multiplying power given by this machine has been applied to a great variety of useful purposes, such as compressing bales of cotton, paper, etc., expressing oils, bending (and 'forging') iron plates and bars, and raising weights. It was used for raising the tubes of the Britannia Bridge.

HYDRAULIC PROPELLER: see NAUTILUS PROPELLER.

HYDRAUL'IC RAM: a simple and conveniently applied mechanism, by which the momentum or weight of falling water can be made available for raising a portion of itself to a considerable height. In the annexed figure, which represents a section of Montgolfier's hydraulic ram, R is the reservoir from which the water falls, RS the height of the fall, and ST the horizontal tube which conducts the water to the engine, ABHTC. E and D are two valves, the



former of which closes its cavity by ascending, the latter by descending; and FG is a pipe reaching within a very little of the bottom, CB. The valves are such that the water at its normal pressure cannot support their weight; the valve, E, is prevented from falling below a certain point by a knob above *mn*. When the water is allowed to descend from the reservoir, after filling the tube, BHS, is rushes out at the aperture *mn*, till its velocity in descending RST becomes so great as to force up the valve, E, and close the means of escape. The water, being thus suddenly checked, and unable to find a passage at *mn*, will produce a great action on

every part of the containing vessels, and by its momentum raise the valve, D. A portion of water being admitted into the vessel, ABC, the impulse of the column of fluid is expended, the valves D and E fall; the opening at D being thus closed, and that at *mn* opened. The water now rushes out at *mn* as before, till its motion is again stopped by its carrying up the valve, E, when the operation is repeated, the fluid impulse opening the valve at D, through which a portion of the water passes into ABC. The valves at E and D thus alternately closing and opening, and water at every opening of D making its way into ABC, the air therein is condensed, for it has no communication with the atmosphere after the water is higher than the bottom of the pipe, FG. This condensed air, then, exercises great force on the surface, *op*, of the water, and raises it in the tube, FG, to a height proportioned to the elasticity of the imprisoned air. The principles of the hydraulic ram are capable of very extensive application. In well-constructed rams, the mechanical effect obtained has been found to be about two-thirds of the energy of falling water. For raising comparatively small quantities of water, such as are necessary for the supply of single houses, farm-yards, etc., where water at the lower level is plentiful and cheap, the hydraulic ram is a most useful piece of mechanism. Its details have been greatly improved since the time of Montgolfier.

HYDRAZIDES: organic compounds containing the hypothetical monovalent group $NH.NH_2$. They are formed by the action of ACID CHLORIDES (q.v.), or of ESTERS (q.v.), on hydrazine, and, as they usually crystallize readily, they are sometimes used for the separation or identification of organic acids in mixtures. The same remarks apply to the PHENYLHYDRAZIDES, containing the group $NHNHC_6H_5$. These are formed from PHENYLHYDRAZINE (q.v.) in the manner described above, and also from this compound and certain substances containing a HYDROXYL GROUP (q.v.). Their production is, therefore, used as a test for the presence of this latter radical.

HY'DRAZINE, or DI-AMIDOGEN, a substance having the formula N_2H_4 (or $H_2N.NH_2$), obtained (together with oxalic acid, $H_2C_2O_4$) by heating an aqueous solution of the complicated substance known as triazoacetic acid $(C_3H_3N_6)_3(COOH)_3$. It is a gas with a peculiar penetrating odor, but the properties of the pure substance are imperfectly known, on account of the avidity with which it combines with water to form the hydrate $N_2H_4.H_2O$, and the consequent difficulty of isolating it. Hydrazine is a powerful base, combining with acids to produce numerous definite crystalline salts. The hydrate may be prepared by boiling the sulphate with a solution of caustic soda. It is a fuming liquid, somewhat oily in appearance, and boiling at 245° F.

(2) The substances derived from hydrazine by replac-

ing one or more of its hydrogen atoms by compound radicals are also called 'hydrazines.' If only one hydrogen atom is replaced the hydrazine is said to be 'primary.' If two hydrogen atoms are replaced, the hydrazine is said to be 'secondary.' The radical which replaces the hydrogen may belong to the fatty series, or to the aromatic series. One or more of the hydrogen atoms may also be replaced by a metal, such as sodium. The most important of the organic hydrazines is phenyl hydrazine, $(C_6H_5)HN.NH_2$, in which one of the hydrogen atoms is replaced by the aromatic radical phenyl, C_6H_5.

HYDRAZOIC ACID: formerly called azoimode, $HN<\begin{matrix}N\\N\end{matrix}$, is prepared in a variety of ways, most simply by the action of nitrous oxide, N_2O, on sodamide, $NaNH_2$, the sodium derivative of ammonia. This gives the sodium salt of hydrazoic acid, from which the acid itself is liberated by means of hydrochloric acid. Hydrazoic acid is a water-clear, mobile, very volatile liquid, boiling at 37° C. It is highly explosive, and its vapor, which is poisonous, has an offensive odor resembling that of phosphine. It is a very strong acid, and its salts resemble, in general, those of hydrochloric acid, except that the former are all explosive, while the latter are not. Hydrazoic acid is miscible with water in all proportions, and these solutions, except the more concentrated, are not dangerous. Hydrazoic acid, besides its intrinsic interest as a simple compound of hydrogen and nitrogen, is related to some substances which are very important in organic chemistry, especially for synthetic purposes.

HYDRENCEPHALOCELE, n. *hī'drĕn-sĕf'ă-lō-sēl* [Gr. *hudōr,* water; *engkĕph'ălon,* the brain; *kēlē,* a tumor]: a tumor occasioned by a hernial protrusion of brain and cerebrospinal fluid through a fissure in the cranium. HY'DRENCEPH'ALOID, a. *-sĕf'ă-loyd* [Gr. *eidos,* likeness]: resembling hydrocephalus or dropsy of the brain. HY'DRENTER'ŌCELE, n. *-tĕr'ō-sēl* [Gr. *entĕrā,* the bowels; *kēlē,* a tumor]: dropsy of the scrotum complicated with intestinal hernia.

HYDRIDÆ, *hī'drĭ-dē:* family of water snakes, now called HYDROPHIDÆ (q.v.).

HYDRIDE, n. *hī'drīd* [Gr. *hudōr,* water]: chemical compound of hydrogen with another element; the term is applied both to combinations of hydrogen with metals, and to similar combinations with organic or compound radicals. Hydrogen forms hydrides with at least four metals—arsenic, antimony, copper and potassium. The first two of these hydrides are the well-known gases, arseniuretted hydrogen (AsH_3) and antimoniuretted hydrogen (SbH_2). The hydride of methylbor marsh-gas (C_2H_5H) and the hydride of ethyl (C_2H_3H) are examples of the second varieties of hydrides. HYDRIC, a. *drik:* containing hydrogen.

HYDRIODIC ACID, *hī-drī-ŏd'ĭk:* formula HI, an acid composed of hydrogen and iodine. It is analogous to the more familiar hydrochloric acid, both in its chemical structure and in its general properties. It may be prepared by the direct union of hydrogen and iodine at a red heat. A more convenient method, however, consists in passing sulphuretted hydrogen gas (H_2S) through water in which a little pulverized iodine is suspended. The aqueous solution so prepared possesses strongly acid properties and combines with bases to form iodides. From it pure hydriodic acid free from water may be prepared. The pure acid is a colorless gas, with an odor similar to that of hydrochloric acid gas. It has a density about 63 times a great as that of hydrogen, and at a temperature of 32° F. it condenses to a liquid when subjected to a pressure of four atmospheres. It dissolves freely in water; the aqueous solution is colorless when pure, but it is slowly decomposed by sunlight, becoming dark from the liberation of iodine.

HYDROBORACITE, n. *hī'drō-bŏr'ă-sīt* [Gr. *hudōr*, water; Eng. *boracite*]: a mineral, a gypseous-like compound having a radiated-fibrous and foliated structure, and generally freckled with spots of iron oxide.

HYDROBROMIC ACID: formula HBr, a compound of hydrogen and bromides, analogous in its general properties to hydrochloric acid (q.v.). Pure hydrobromic acid, when free from water, is a colorless gas, having a density about 39.1 times as great as that of hydrogen. Under ordinary atmospheric pressure it condenses into a liquid at 99° F. below zero, and at a slightly lower temperature it crystallizes. It dissolves freely in water, a saturated solution, at 32° F., having a specific gravity of 1.78. It is a powerful acid, forming, with metallic bases and with organic radicals, definite salts called 'bromides.' The bromides of the alkalies are greatly used in medicine as sedatives. Hydrogen and bromide do not combine directly, even in strong sunlight; but when hydrogen that is charged with bromine vapor is burned, hydrobromic acid and water are formed. Hydrogen and bromine may also be made to combine by electric sparks, or by passing the mixed gases over hot platinum. The most convenient way of preparing the acid, however, is by the action of bromine upon water, in the presence of phosphorus, the reaction being $4H_2O+5Br+P=5HBr+H_3PO_4$. Phosphoric acid, it will be seen, is formed at the same time; but the two are easily separated by heat.

HYDROCARBONS, n. plu. *hī-drō-kâr'bŏns* [Gr. *hudōr*, water; Eng. *carbon*]: compounds consisting solely of carbon and hydrogen. They are exceedingly numerous, and many of them occur in nature, both in petroleum, asphaltum, and other similar materials, and in the essential oils of plants. The hydrocarbons can be broadly divided into two general classes, according to the way in

which the carbon atoms that they contain are connected to one another. In the fatty series, the atoms are all connected in open chains, while in the aromatic series the carbon atoms are connected with one another in such a manner as to form closed rings. As a class the hydrocarbons are insoluble in water; they cannot be saponified; and they are neutral, and do not combine with acids to form salts.

The classification of the hydrocarbons is as yet incomplete; but the greater number of those that are known can be included in one or another of the following groups:

1. The *Paraffins*, having the general formula C_nH_{2n+2}. The lowest member of this series is methane, or marsh gas, CH_4, and many other members of the series are known, each containing one carbon atom and two hydrogen atoms more than its immediate predecessor. See PARAFFINS.

2. The *Olefines*, having the general formula C_nH_{2n}. Ethylene, C_2H_4, is the simplest member of this series.

3. The *Acetylene* series, having the general formula C_2H_{2n-2}. Acetylene gas, C_2H_2, is the simplest representative of this series.

The foregoing all belong to the fatty sub-division. To them we may add:

4. The *Benzene* series, having the general formula C_nH_{2n-6}, and

5. The *Terpenes*, a class of substances having the general formula $C_{10}H_{16}$. Both of these latter series belong to the aromatic subdivision of the general hydrocarbon group.

HYDROCAULUS, n. *hī'drō-kawl'ŭs* [Gr. *hudra*, a water-serpent; *kaulos*, a stem]: in *zool.*, the main stem of the cœnosarc of a hydrozoon.

HYDROCELE, n. *hī'drō-sēl* [Gr. *hudōr*, water; *kēlē*, a tumor]: dropsy of the tunica vaginalis, a serous membrane or sac investing the testis. Hydrocele (popularly, dropsy of the testicle) occurs as a smooth, pear-shaped swelling, fluctuating when pressed, devoid of pain or tenderness, though sometimes causing slight uneasiness from its weight.

The quantity of serous fluid in the sac is usually 6 to 20 ounces, but it occasionally exceeds 100 ounces. Hydrocele may occur as a result of acute inflammation, but it usually comes without apparent local cause. It is most frequent about or beyond middle life, and generally in persons of feeble power, or with a tendency to gout; sometimes, however, it occurs in young children, either in the same form as in adults, or as what is termed *congenital hydrocele*, when the communication between the tunica vaginalis and the abdominal peritoneum is not obliterated, as it normally should be.

The treatment is divided into the *palliative* and the *curative*. By the former, the surgeon relieves the present

annoyance of his patient, while by the latter he aims at the permanent removal of the disease. The palliative treatment consists in the use of suspensory bandages, evaporating and discutient lotions, and tapping with a fine trochar. Tapping seldom gives more than temporary relief, the swelling usually again regaining its former bulk in three or four months.

The curative treatment consists in setting up sufficient inflammation in the tunica vaginalis to destroy its undue secreting faculty. This is most commonly done by the injection of tincture of iodine into the sac, or by the passage of a fine seton or an iron wire through it.

HYDROCEPHALUS, n. *hī'drō-sĕf'ă-lŭs* [Gr. *hudōr*, water; *kĕphălē*, the head]: dropsy of the head, generally known as water in the head. HY'DROCEPHAL'IC, a. *-sē-făl'ĭk*, relating to or connected with hydrocephalus.—*Hydrocephalus* includes two distinct diseases—acute hydrocephalus and chronic hydrocephalus.

Acute hydrocephalus is a tuberculous meningitis or inflammation of the membranes—inflammation of the brain. The name is not a good one, as it refers merely to a symptom of the disease, and not to its cause or essence. The premonitory symptoms (which, however, do not occur in all cases) consist chiefly in a morbid state of the nutritive functions. The appetite is capricious, the tongue foul, the breath offensive, the belly enlarged, and sometimes tender, and the evacuations unnatural; and the child is heavy, languid, and dejected, and becomes either fretful and irritable, or drowsy and listless. Restless sleep, attended by grinding of the teeth or moaning, a frequent sudden scream, clenching of the fists, and a turning in of the thumb toward the palm of the hand, are also important premonitory signs. After these symptoms have lasted some days, severe pain in the head comes on; it is generally of a sharp or shooting character, recurring at intervals, often during sleep, and causing the child to shriek. Coma or morbid drowsiness supervenes, and the shrieking is replaced by moaning. Vomiting is a frequent concomitant. In this first stage of tuberculous meningitis, which commonly lasts two or three days, the pulse is rapid, and the symptoms generally are those of excitement. In the second stage, the pulse becomes irregular, variable, and often slow; general heaviness and stupor come on; the light, which annoyed the child in the first stage, is no longer a source of annoyance; the pupils become dilated, the sight becomes imperfect or lost, and squinting is almost always observed. The little patient now lies on its back in a drowsy condition; and at this period spasmodic twitchings, convulsions, or paralysis may come on. The excretions are passed unconsciously. This second stage may last a week or two, and is often attended by deceptive appearances of amendment, the child frequently regaining the use of its senses for a day or two, but then

relapsing into a deeper stupor than before. The symptoms in the third or last stage, which may last only a few hours, or may extend to a fortnight, are very similar to those in the second, except that the pulse again becomes very rapid, beating sometimes so quickly that it can scarcely be counted, and gradually gets more and more weak, till the patient expires. The characteristic appearances after death are softening of the central part of the brain, with the effusion of serous fluid, usually to the extent of several ounces, into the ventricles; and a tuberculous deposit, in the shape of small granules, upon or between the membranes of the brain. It is essentially a disease of childhood, scarcely ever occurring after the 12th year. Half the cases are in children between three and six years of age. As the treatment should be left entirely to the physician, it is unnecessary to notice it here. Under any form of treatment the mortality is very high.

Chronic hydrocephalus is a perfectly distinct disease from acute hydrocephalus: the acute is an inflammation, the chronic is a dropsy. In chronic hydrocephalus a watery fluid collects within the skull, before the bones have united to form the solid brain case, and by pressure outward causes the bones to separate, and increases the size of the head sometimes to an enormous extent. The name in this case is more appropriate than is that of acute hydrocephalus. While the skull is rapidly enlarging, the bones of the face grow no faster than usual, and the great disproportion of size between the head and the face is at once diagnostic of the disease. This disorder sometimes commences before birth, and almost always in early childhood, before the fontanelles and sutures of the skull have closed. In some rare cases, it has occurred later, as, for example, at seven or nine years old, and the closed sutures have opened under the augmenting pressure. When the sutures will not yield, death from pressure on the brain speedily ensues. Most children with chronic hydrocephalus either recover or die in infancy; but a few survive, bearing their disease to adult life, or even to old age. Blindness, deafness, palsy, and idiocy—one or more—are commonly associated with this disease, but occasionally the intellect and senses are sufficient for the ordinary requirements of social life. The treatment may be attempted by internal remedies or by surgical measures. The medical treatment most worthy of trial consists in the administration of diuretics, purgatives, and especially mercury, which may be given in the form of calomel in minute doses, and applied as ointment externally. The surgical expedients are bandaging and puncturing the head. The former has in some cases effected a permanent cure; the latter has in many cases certainly prolonged life, though the disease has finally conquered. Neither of these means is applicable after the bones of the skull have united. This disease occa-

sionally occurs in adult or in advanced life, after enlargement of the head has become impossible. Stupor, paralysis, and an inability or unwillingness to speak, are in these cases the most prominent symptoms.

HYDROCHARID'EÆ, or HYDROCHARIDACEÆ. See ANACHARIS; VALLISNERIA.

HYDROCHLORATE, n. *hī'drō-klō'rāt* [Eng. *hydrogen*, and *chlorine*]: a compound of hydrochloric acid with a base. HY'DROCHLO'RIC, a. *-klō'rĭk*, consisting of hydrogen and chlorine.

HYDROCHLORIC ACID, formula HCl, a compound of hydrogen and chlorine. Pure hydrochloric acid is a colorless gas, 1,269 times as heavy as an equal volume of air at the same temperature and pressure. At a temperature of 50° F. it condenses, under a pressure of 40 atmospheres, to a colorless liquid. It is intensely acid, irrespirable, and even when largely diluted, very irritating to the lungs and eyes. Though hydrogen and chlorine, if mixed in equal volumes and kept in the dark, are without action upon each other, hydrochloric acid is formed by exposing the mixture to diffuse daylight, the combination taking place quietly under these circumstances, but explosively under the influence of direct sunlight. A more convenient and usual method of preparing hydrochloric acid is by treating common salt ('sodium chlorid,' HaCl) with strong sulphuric acid (H_2SO_4). Hydrochloric acid gas was first prepared, in an approximately pure state, by Priestley, in 1774; but it was believed to be an oxid of a new element (provisionally called 'murium') until Davy, in 1810, showed that it is a compound of hydrogen and chlorine.

Hydrochloric acid gas is exceedingly soluble in water. By passing a stream of the gaseous acid into water, an aqueous solution may be prepared which has a specific gravity, when saturated, of 1.21. The aqueous solution has been known from very early times under the names of spirit of salt and muriatic acid; the commercial acid is still commonly known by the latter name. Large quantities of it are obtained as a by-product in the manufacture of sodium carbonate from common salt; but the acid so produced is not entirely pure, and the traces of iron and other impurities that are present give it a yellowish tinge. Aqueous hydrochloric acid is largely used in the laboratory, and also in the arts in the manufacture of a great variety of substances. Hydrochloric acid combines with metallic bases to form salts which are known as 'chlorids.' Common salt (chlorid of sodium, NaCl) is the most familiar and the most abundant example, in nature, of this class of substances.

HYDROCOTYLE, *hī-dro-kŏt'ĭ-lē:* genus of umbelliferous plants, having simple umbels, entire acute petals, and fruit of two flat orbicular carpels, with five more or less distinct thread-like ribs, and no vittæ. The species

are numerous, generally more or less aquatic, widely distributed. One *H. vulgaris,* which grows in marshy places, is called in Britain MARSH PENNYWORT from the orbicular leaves; and sometimes White-rot, Sheepsbane, Flowkwort, etc., from a notion that it is injurious to sheep which eat it, causing foot-rot or fluke-worm—effects to be ascribed rather to the marshy situations in which it grows.

HYDROCYANATE, n. *hī'drō-sī'ă-nāt* [Eng. *hydrogen,* and *cyanogen*]: a compound of hydrocyanic acid with a base. HY'DROCYAN'IC, a. *-ăn'ĭk,* consisting of hydrogen and cyanogen.

HYDROCYANIC ACID, *hī-drō-sī-ăn'ĭk* (HNC): popularly known as PRUSSIC ACID (q.v.), from its having been obtained first by Scheele, 1782, from the substance known as Prussian or Berlin Blue ferric ferrocyanide. Hydrocyanic acid is formed by the action of the enzyme, or unorganized ferment, called amygdalin, on certain GLUCOSIDES (q.v.), as for example, those contained in the kernels of apricots or cherry stones, of bitter almonds, or of laurel leaves. The ferment and glucoside are present together in these substances and, if they are broken up and placed in water, at about the ordinary room temperature, the ferment acts on the glucoside, forming a sugar, benzaldehyde and hydrocyanic acid. It is prepared artificially in many ways, the simplest being to heat ammonium formate, $HCOONH_4$, which then decomposes into water and hydrocyanic acid. Hydrocyanic acid is a mobile, volatile liquid, boiling at 26°.5 C. At 15° C. it crystallizes. Its vapor has an odor of bitter almonds and it is a violent poison. In dilute aqueous solution it is used medicinally. These solutions soon decompose, giving brown, amorphous materials. Hydrocyanic acid is largely used for synthetical purposes in organic chemistry, especially for the introduction, into a compound, of the cyanogen radical, —CN. From the resulting products acids and bases can be prepared easily. Hydrocyanic acid is TAUTOMERIC (q.v.). In some reactions it behaves as if the hydrogen were linked to nitrogen, HN=C, in others as if it were combined with carbon, HC≡N. The metallic cyanides resemble, in general, the chlorides and are used extensively in the arts. Gold is extracted cheaply from many of its low grade ores by treatment with a dilute solution of sodium or potassium cyanide. For electro-plating with gold or silver a solution is employed consisting of a double cyanide of the metal in question with sodium or potassium cyanide. Occasionally these latter salts are used as fluxes. All the simple cyanides, in so far as they are soluble, are violent poisons. Many complex cyanides are known, the most common being potassium ferrocyanide, $K_4Fe(CN)6$ (yellow prussiate of potassium), and prussian blue (ferric ferrocyanide), $Fe_4[Fe(CN)_6]_3$. The more important of

these compounds are described under the respective metals.

2. *Its Medicinal Uses.*—We are indebted to the Italians for the introduction of hydrocyanic acid into the materia medica; and it was employed first at the beginning of the 19th c. There are no cases in which it is so serviceable as in those affections of the stomach in which pain is a leading symptom, as in gastrodynia, water-brash, and in intense vomiting. Hence it is often useful in English cholera, when opium has completely failed. In pulmonary diseases, it does not produce the good effects formerly ascribed to it; but it is sometimes useful in allaying spasmodic cough. It has been employed with advantage in chronic skin-diseases, to allay pain and irritation. A mixture of two drachms of the dilute acid (of 2 per cent. strength) with half a pint of rose-water, and half an ounce of rectified spirits, forms a good lotion. When given internally, the average dose is from 3 to 5 minims of the 2 per cent. dilute acid, three or four times a day; it must be administered in some milk vehicle, such as simple water, or orange-flower water.

3. *As a Poison.*—Hydrocyanic acid is one of the most energetic poisons, and is frequently employed in murder and suicide. When a *small* poisonous dose (about half a drachm of the 2 per cent. acid) has been taken, the first symptoms are, weight and pain in the head, with confusion of thought, giddiness, nausea (sometimes vomiting), a quick pulse, and loss of muscular power. If death result, this is preceded by tetanic spasms and involuntary evacuations. When a *large* dose has been taken (as from half an ounce to an ounce of the 2 per cent. acid), the symptoms may commence instantaneously, and it is seldom that their appearance is delayed beyond one or two minutes.

Where the fatal action is so rapid, antidotes are of comparatively little value. Chlorine, ammonia, cold affusion, and artificial respiration are the most important agents in the treatment. The first two should be used with great caution, and only by the medical practitioner. Cold affusion on the head, neck, and down the spine is a valuable remedy. Artificial respiration should never be omitted.

HYDROCYANIDE, n. *hī-drō-sī′ă-nīd* [Eng. *hydrogen*, and *cyanogen*]: a compound of hydrocyanic acid with a base. HY′DROCYAN′IC, a. *-ăn-ĭk*, consisting of hydrogen and cyanogen.

HYDROCYSTS, n. plu. *hī′drō-sĭsts* [Gr. *hudra*, a water-serpent; *kustis*, a bladder, a cyst]: in *zool.*, curious processes attached to the cœnosarc of the Physophoridæ, and termed feelers.

HYDRODYNAMIC, a. *hī′drō-dī-năm′ĭk* [Gr. *hudōr*, water; *dŭnămis*, power, force]: pertaining to or derived from the force or pressure of water.

HYDRODYNAMICS, *hī-dro-dī-năm'ĭks:* in a general sense, science which treats of the phenomena of water or other fluids at rest or in motion, thus including both *hydraulics* and *hydrostatics.* But in the strict sense it is usually applied to the laws of the motion of liquids; the flow of water from orifices and in pipes, canals, and rivers; its oscillations or waves; and its resistance to bodies moving through it. The term hydraulics (q.v.) is sometimes applied to the same subjects (see also HYDROSTATICS). The application of water as a moving power forms the practical part of Hydrodynamics.—In that which follows, the illustrations are taken mostly from the case of water, but the principles established are true of liquids in general.

Efflux.—If three apertures, C, D, E, are made at different heights in the side of a vessel (fig. 1) filled with water, the liquid will pour out with greater impetuosity from C than from D, and from E than from C. The velocity does not increase in the simple ratio of the depth. The exact law of dependence is known as the theorem of Torricelli; the demonstration is too abstruse for introduction here, but the law itself is as follows: '*Particles of fluid, on issuing from an aperture, possess the same degree of velocity as if they had fallen freely, in vacuo, from a height equal to the distance of the surface of the fluid above the centre of the aperture.*' The jet from C, for instance, has the same velocity as if the particles composing it had fallen in vacuo from the level of the liquid to C. Now, the velocity acquired by a body in falling is as the time of the fall; but the space fallen through being as the *square* of the time, it follows that the velocity acquired is as the square root of the space fallen through. In the first second, a body falls 16 ft.,

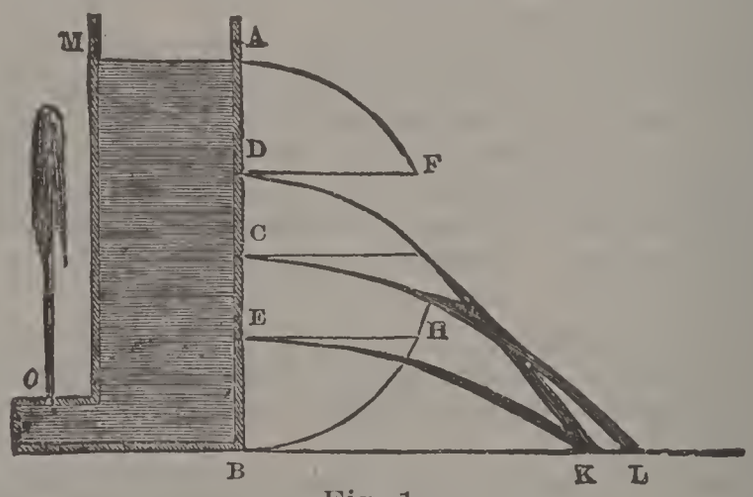


Fig. 1.

and acquires a velocity of 32 ft. If E, then, is 16 ft. below the level, a jet from E flows at the rate of 32 ft.; and if D is at a depth of 4 ft., the velocity of the jet at D will be half the velocity of that at E, or 16 ft. To find the velocity for a given height, multiply the height

by 2×32, and extract the square root of the product. This rule may be expressed by the formula $v = \sqrt{2gh}$, in which v signifies the velocity of the issue, g the velocity given by gravity in a second, or 32 ft., and h the height of the water in the reservoir above the orifice. This last quantity is technically called the *head* or *charge*.

That this theory of the efflux of liquids is correct, may be proved by experiment. Let the vessel, MB (fig. 1), have an orifice situated as at *o*; the water ought to issue with the velocity that a body would acquire in falling from M to the level of *o*. Now, it is established in the doctrine of Projectiles (q.v.), that when a body is projected vertically upward with a certain velocity, it ascends to the same height from which it would require to fall in order to acquire that velocity. If the theory, then, is correct, the jet ought to rise to the level of the water in the vessel at M. It is found in reality to fall short of this; but not more than can be accounted for by friction, the resistance of the air, and the water that rests on the top in endeavoring to descend. When the jet receives a very slight inclination, so that the returning water falls down by the side of the ascending, ten inches of head of water may be made to give a jet of nine inches. A stream of water spouting out horizontally, or in any oblique direction, obeys the laws of projectiles, and moves in a parabola; and the range of the jet for any given velocity and angle of direction may be calculated precisely as in projectiles. The range of horizontal jets is readily determined by practical geometry. On AB describe a semicircle; from D, the orifice of the jet, draw DF perpendicular to AB, and make BK equal to twice DF; then it can be proved by the laws of falling bodies and the properties of the circle, that the jet must meet BL in the point K. If BE is equal to AD, the perpendicular EH is equal to DF; and therefore a jet from E will have the same range as that from D. Of all the perpendiculars, CG, drawn from the middle point C, is the greatest; therefore, the jet from C has the longest possible range.

The area of the orifice and the velocity of the flow being known, it is easy to calculate the quantity of water discharged in a given time. Thus, suppose the area to be 1 sq. inch, and the velocity 20 ft a second, it is evident that there issues in a second a cylinder or a prism of water 1 sq. inch in section and 20 ft. long, the content of which is $1 \times 240 = 240$ cubic inches. In any given time, then, as three minutes (=180 seconds), the discharge is $240 \times 180 =$ 43,200 cubic inches.

It has as yet been assumed that the water in the vessel or reservoir is kept constantly at the same height, and that thus the velocity is constant. We have now to consider the case of a vessel allowed to empty itself through an orifice at the bottom. As the surface of the water sinks, the velocity of the discharge diminishes or is retarded; and when the vessel is of the same area from top to bottom, it can be proved that the velocity is *uniformly* retarded. Its motion follows the same law as that of a body projected vertically upward. Now, when a motion uniformly retarded comes to an end, the space described is just half

what the body would have passed over, had it gone on uniformly with the velocity it had at the outset. Therefore, when the vessel has emptied itself in the way supposed, the quantity discharged is half what would have been discharged had the velocity been uniform from the beginning.

The 'Contraction of the Vein.'—When, by means of the area of the opening and the velocity thus determined, we calculate the number of cubic ft. or of gallons that *ought* to flow out in a given time, and then measure the quantity that actually does flow, we find that the actual flow falls short of the theoretical by at least a third. In fact, it is only the central part of the jet, which approaches the opening directly, that has the velocity above stated. The outer particles approach from all sides, with less velocity; they jostle one another, as it were, and thus the flow is retarded. In consequence of this want of uniformity in velocity and direction among the component layers of the jet, as they enter the orifice, there takes place what is called a 'contraction of the vein' (*vena contracta*); that is, the jet, after leaving the orifice, tapers, and becomes narrower. The greatest contraction is at a distance from the orifice equal to half its diameter; and there the section of the stream is about two-thirds the area of the opening. It is, in fact, the section of the contracted vein that is to be taken as the real area of the orifice, in calculating by the theory the quantity of water discharged. If the wall of the vessel has considerable thickness, and the orifice is made to widen gradually inward, in the proportions of the contracted vein, the stream does not suffer contraction, and the area of the orifice where it is narrowest may be taken as the actual area of discharge.

Adjutages.—It has as yet been supposed that the issue is by means of a simple opening or hole in the side or bottom of the vessel; but if the flow takes place through a short tube, the rate of discharge is remarkably affected. Through a simple opening, in a thin plate, the actual discharge is only about 64 per cent. of the theoretical; through a cylindrical conducting-tube, or *adjutage*, as it is called, of like diameter, and whose length is four times its diameter, the discharge is 84 per cent. The effect is still greater if the discharge-tube is made conical both ways, first contracting like the contracted vein, and then widening. The effect of a conducting-tube in increasing the discharge is accounted for by the adhesion of the water to its sides, which widens out the column to a greater area than it would naturally have. It has thus a tendency to form a vacuum in the tube, which acts like suction on the water in the reservoir, and increases the quantity discharged. The flow is more free if the orifice is in the bottom of the vessel, than in the side on a level with the bottom. If the discharge-tube is made to project inward beyond the thickness of the walls of the vessel, the velocity is much impeded, owing to the opposing currents produced by the water approaching the opening.

Pipes—When a conduit pipe is of any considerable length, the water issues from it at a velocity less than that

due to the head of water in the reservoir, owing to the resistance of friction. With a pipe, for instance, of 1⅓ inch in diameter, and 30 ft. long, the discharge is only one half what it would be from a simple orifice of the same diameter. The rate of reduction depends on the diameter of the tube, its length, the bendings it undergoes, etc. The resistance to the flow of water in pipes does not arise properly from friction, as understood of solids, but from the adhesion of the water to the sides of the pipe, and from the cohesion of the watery particles among themselves; it makes little difference, therefore, whether an earthenware pipe, for instance, be glazed or not. Large projections form an obstacle; but mere roughness of surface is filled up by an adhering film of water, which is as good as a glaze. The resistance increases greatly with the narrowness of the pipes. Engineers have formulas, deduced in great part from experiment, for calculating the discharge through pipes of given length and diameter, and with a given head; but the subject is too complicated for introduction here. If water flowed in a conduit pipe without friction or other obstruction, so that its velocity were always equal to that due to the head of water, there would be no lateral or bursting pressure on the walls of the pipe; and if the pipe were pierced, the water would not squirt

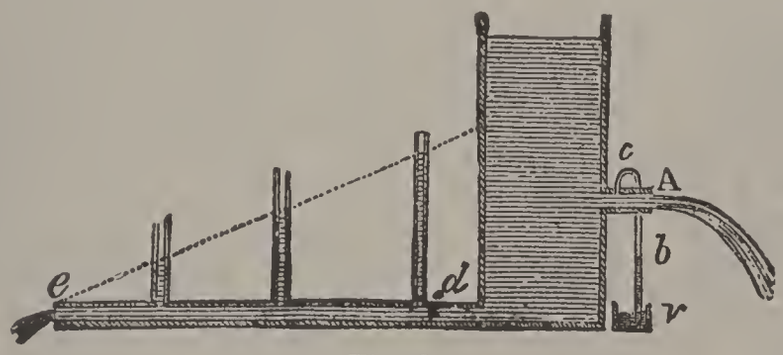


Fig. 2.

out. Accordingly, with a short tube or adjutage, which, instead of obstructing, increases the flow, there is not only no lateral outward pressure on the walls of the tube, but there is actually a pressure inward. If a hole is made in the wall of a cylindrical adjutage, A (Fig. 2), and the one end of a small bent tube, *bc*, is inserted in the hole, while its other end is dipped in a vessel of water, *V*, the water will be sucked up the tube, showing the tendency that the adjutage has to form a vacuum. But when the velocity of discharge is diminished by the friction of a long pipe, or by any narrowing, bending, or other obstruction in the pipe, then that portion of the pressure of the head of water that is not carried off in the discharge, becomes a bursting pressure on the walls of the pipe. This pressure is unequal at different parts of the pipe. At the end *e*, where the water issues free and unobstructed, it is next to nothing, and gradually increases toward the reservoir at *d*, where it is equal to the difference between the head of water in the cistern, and the head due to the velocity with which the water is actually flowing in the pipe. The principle now explained accounts for the fact, that pipes often burst or

begin to leak on the motion of the water in them being checked or stopped.

Resistance of Water to Bodies moving through it.—This is greatly affected by the shape of the body, which ought to have all its surfaces oblique to the direction of the motion. When a cylinder terminates in front in a hemisphere, the resistance is only one-half what it is when the cylinder terminates in a plane surface at right angles to the axis; and if instead of a hemisphere, the termination is an equilateral cone, the resistance is only one-fourth. If a globe is cut in halves, and a cylinder, whose length and the diameter of whose base are each equal to the diameter of the globe, is fixed between them; this cylinder with hemispherical ends experiences less resistance than the globe alone, the diminution being about one-fifth of the resistance to the globe. Also the resistance increases in a higher ratio than the simple one of the velocity. One part of the resistance arises from the momentum that the body has to give to the water it displaces. Moving at a certain rate, it displaces a certain quantity; moving at twice that rate, it displaces twice the quantity in the same time. But not only does it displace twice the number of particles of water; it also has to displace them with twice the velocity; the pressure of the resistance is thus not merely doubled, but quadrupled or squared. Similarly, when the velocity is tripled, the resistance arising from the simple displacement of water becomes nine times as great. Another part of the resistance of liquids to bodies moving in them is owing to the cohesion of the particles, which have not to be thrown aside merely as separate grains, but to be torn asunder. In addition to this, when the velocity is considerable, the water becomes heaped up in front, and depressed at the other end from not having time to close in behind, thus causing an excess of hydrostatic pressure against the direction of the motion. Owing to the combination of these causes, the real law of the increase of resistance is difficult to investigate, and the results of experiments are not a little discordant. See WATER-POWER; WAVES.

HYDROFLUATE, n. *hī'drō-flō'āt* [Eng. *hydrogen*, and *fluorine*]: a compound of hydrofluoric acid with a base. HY'DROFLUOR'IC, a. *-ŏr'ĭk*, consisting of hydrogen and fluorine. HYDROFLUORIC ACID, formula HF, a compound of hydrogen and fluorine. Hydrofluoric acid is a colorless gas at ordinary temperatures and pressures, fuming strongly in the air; it condenses at 5° F. below zero to a colorless, mobile liquid, specific gravity about 0.988. As thus prepared, liquid hydrofluoric acid contains traces of water, which may be removed by electrolysis. Fluorine and hydrogen combine directly, even in the dark, to form hydrofluoric acid. It is more conveniently prepared by the action of strong sulphuric acid on the mineral fluorite (q.v.). The commercial importance of hydrofluoric acid

is due to the fact that it attacks glass very freely, and is, therefore, used in etching on glass. See FLUORINE.

HYDROFLUOSILICIC ACID, *hī'drō-flô-ō-sĭ-lĭs'ĭk* [*hydro*, Eng. *fluor*, or *fluorine*, and *silicic*]: a powerful acid, a double fluoride of hydrogen and silicon, formed by the action of water on fluoride of silicon: it is used in testing for barium and potassium.

HYDROGEN, n. *hī'drō-jĕn* [Gr. *hudōr*, water; *gennăō*, I generate or produce]: an elementary substance which, as a gaseous body, is the lightest of all known bodies. It produces water when combined with oxygen. HYDROG'ENATE, v. *-drŏj'ĕ-nāt*, or HYDROG'ENIZE, v. *-nīz*, to combine hydrogen with. HYDROG'ENATING, or HYDROG'ENIZING, imp. HYDROG'ENATED, or HYDROG'ENIZED, pp. *-nīzd*. HYDROG'ENOUS, a. *-ĕ-nŭs*, pertaining to or containing hydrogen; formed by water; in *geol.*, applied to rocks formed by water, in opposition to *pyrogenous*, those formed by fire. SULPHURETTED HYDROGEN, a combination of hydrogen with sulphur, producing a gas having a smell like rotten eggs, found as a constituent of mineral waters.

HYDROGEN (symbol H, atomic weight =1, or 1.008 if oxygen =16): Hydrogen is a colorless, odorless, elementary gas, probably the most widely distributed body known, because it is found in the sun, fixed stars and nebulæ. It is found in the free state in certain minerals, including some varieties of rock salt and in volcanic gases, and is produced by the fermentation of cellulose in absence of air, as for instance, at the bottom of the sea. Very small amounts of hydrogen are present in air, but, apparently, the attraction of the earth is not great enough to retain it permanently. Enormous quantities exist free in the sun. Next to oxygen, hydrogen is the most plentiful constituent of the earth. It is found chiefly combined with the former element, as water, which, in addition to its occurrence in the oceans, etc., is a constituent of many minerals, and of all plants and animals. Hydrogen is produced by the action of many metals on water. Some, such as sodium, potassium, or calcium, react at the ordinary temperature, yielding the metallic hydroxide (caustic soda, caustic potash, slaked lime) in addition to the hydrogen. Other metals react with steam, and also readily liberate hydrogen, at the ordinary temperature, from dilute acids. Zinc, iron, magnesium and aluminum belong to this class. Prepared by these processes, hydrogen is usually impure on account of the presence of foreign matter in the metals. It can be obtained in a high state of purity by passing a current of electricity through dilute sulphuric acid (acidulated water) and drying the gas by placing it in contact with some desiccating agent such as concentrated sulphuric acid. Under very great pressure, hydrogen condenses to a colorless liquid, which boils at —252.°6 C. At lower temperatures it solidifies to a white crystalline mass.

which melts at —258.°6. On account of the difficulty with which it is liquefied, hydrogen is used to fill thermometers where great accuracy is required. Hydrogen is the lightest substance known, and is, therefore, used to fill balloons where cost is not the first consideration. It explodes when mixed with chlorine and exposed to bright light, but when *mixed with* oxygen the application of a flame or spark is necessary in order to produce combination, which is accompanied by a violent explosion. In an atmosphere of oxygen, hydrogen burns quietly with an intensely hot flame, which is used where high temperatures are required, as in the fusion of platinum. During its combustion hydrogen evolves sufficient heat to raise 345 times its weight of ice-cold water to the boiling point. The spectrum of hydrogen shows bright lines in the red, blue and violet regions. Chemically, hydrogen is used for REDUCTION (q.v.), either directly, at a high temperature, or by mixing the substance to be reduced with some materials which can produce hydrogen. Under these circumstances the hydrogen is termed NASCENT (q.v.). Hydrogen is the characteristic element in all acids and alkalies.

HYDROGEN, BINOXIDE OF (symbol H_2O_2, equiv. 34): colorless liquid of a syrupy consistence, with specific gravity of 1.45 (water being 1), and a peculiar odor, something like that of a very dilute chlorine. It bleaches vegetable colors, and when applied to the tongue or the skin, produces a white spot, and excites considerable pain. From the readiness with which it gives off its oxygen, it is a powerful oxidizing agent. The method of preparing it is complicated and difficult. This substance was discovered 1818 by Thenard, who termed it oxidized water. Dr. B. W. Richardson, eminent London physician, has lately examined its value (in solution) as a therapeutic agent, and has found it very beneficial in hooping-cough, in certain forms of rheumatism, and (as a palliative) in the last stages of consumption.

HYDROGEN PEROXIDE, also called hydrogen dioxide, H_2O_2, is most conveniently prepared by the action of dilute sulphuric acid on barium dioxide, BaO_2. Clear, colorless, viscid liquid, boiling at 68.7° C. (26 mm. pressure), and solidifying to white crystals at —2.° C. It is formed in small quantity during the combustion of hydrogen, illuminating gas and other substances, and is produced in the course of many chemical reactions. Hydrogen peroxide is used largely for bleaching ivory and other animal products. For bleaching the skin and teeth, for coloring hair golden, and in medicine. It is an excellent antiseptic and is largely employed for chemical purposes, as an oxidizing agent. The liquid usually sold as hydrogen peroxide contains about 3 per cent. or less of this substance, dissolved in water. The pure material is very unstable. In order to prevent corrosion of the teeth these solutions should not be placed in the mouth

unless they are known to be free from acid, which is often present as an impurity. Solutions of hydrogen peroxide of moderate concentration gradually attack the skin. Many quack preparations are on the market, generally with names derived more or less from the words oxygen, ozone or hydrogen peroxide. Wonderful virtues are, of course, claimed for them. Their value, if any, is due to the hydrogen peroxide which they contain, but this never exceeds 3 per cent. and is usually less. The difference between these preparations and ordinary solutions of hydrogen peroxide is essentially in the price, which is necessarily much greater for the former than for the latter. The properties and, therefore, the uses, of hydrogen peroxide all depend on the fact that it readily decomposes into water and oxygen. Certain substances, such as the red coloring matter of the blood and certain finely divided metals like platinum black (see PLATINUM), accelerate this decomposition greatly.

HYDROGNOSY, n. *hī-drŏg'no-sĭ* [prefix *hydro-;* Gr. *gnosis,* knowledge; *gignōskō,* I know]: a treatise on, or a history and description of, the waters of the earth.

HYDROGRAPHY, n. *hī-drŏg'ra-fĭ* [Gr. *hudōr,* water; *graphō,* I describe or write]: art of forming charts representing sea-coasts, seas, gulfs, bays, islands, etc. HY'DROGRAPH'IC, a. *-drō-grăf'ĭk,* or HY'DROGRAPH'ICAL, a. *-ĭ-kăl,* relating to maps or charts representing sea-coasts, rocks, islands, shoals, etc. HYDROG'RAPHER, n. *-drŏg'ra-fĕr,* one who is skilled in. HYDROL'OGY, n. *-drŏl'ŏ-jĭ* [Gr. *logos,* discourse]: the science which treats of water, its properties, phenomena, and distribution. HY'DROLOG'ICAL, a. *-drō-lŏj'ĭ-kăl,* pertaining to.

HYDROGRAPHY, *hī-drŏg'ra-fĭ:* maritime surveying, description of the surface waters of the earth, particularly of the bearings of coasts, gulfs, bays, of currents, soundings, islands, shoals, etc., so far as may be useful in navigation; including therefore the construction of charts, maps, etc., in which these particulars are detailed. Besides its practical use in navigation, it has reference also to science generally. Hydrography is to the sea what geography is to the land. The first step in the erection of hydrography into a science was made in the 15th c. by Henry the Navigator, the first to construct a sea-chart worthy of the name. Among maritime nations hydrography is now made a matter of prime concern; the hydrographic office being an important branch of the naval administration. The head of the hydrographic dept. in the British service is usually a capt. in the royal navy. The officers surveying in different parts of the world send their observations, soundings, etc.; and it is the business of the hydrographer to consolidate these into available maps. In the United States the hydrography is in charge of the coast survey; there is a coast survey office, and in 1866, a hydrographic office was established.

See COAST SURVEY; GEODESY; TRIANGULATION; SOUNDING; DEEP SEA; DREDGE—DREDGING; ATLANTIC OCEAN; PACIFIC OCEAN; CHALLENGER EXPEDITION.

HYDROIDA, n. plu. *hī-droy'dă,* also HYDROID: [G. *hudra,* a water-snake; *eidos,* resemblance]: in *zool.,* the typical sub-class of the Hydrozoa which comprises the animals most nearly allied to the hydra. They have an alimentary region or polypite provided with an adherent disk or hydrorhiza, and prehensile tentacles. Unlike hydra, the type of the sub-class, most of the hydroida live in societies, each of which constitutes a polypidom so like a seaweed that it is often collected as such. But while the apertures on an ordinary seaweed are only minute pores, the hydroida have little cup-like cells along the stem and at the extremities of the branches, in which the individual polype lives. The cells have a small hole at the bottom, and the stalk is hollow, so as to enable the individual polypes to remain part of a compound organism. The sub-class is divided into five orders, Hydrida, Corynida, Sertularida, Campanularida, and Thecomedusæ. The Polyzoa or Bryozoa, once ranked with the sub-class, now figure as a distinct class, arranged under the sub-kingdom Molluscoida. See ACALEPHÆ; GENERATION:, ALTERNATION OF.

HYDROKINET'ICS. See HYDRODYNAMICS.

HYDROLITE. See GMELINITE.

HYDROLOGY. See under HYDROGRAPHY.

HYDROMAGNESITE, n. *hī'drō-măg'nĕ-sīt* [Gr. *hudōr,* water; Eng. *magnesite*]: a native carbonate of magnesia, occurring in white earthy amorphous masses in serpentine rocks.

HYDROMANCY, n. *hī'drō-măn'sĭ* [Gr. *hudōr,* water; *manteia,* divination]: method of predicting events by water, practiced by the ancients (see DIVINATION). HY'DROMAN'TIC, a. *-tĭk,* relating to.

HYDROMA'NIA. See PELLAGRA and SUICIDE.

HYDROMECHANICS, n. *hī-dro-mĕ-kăn'ĭks* [prefix *hydro-;* Eng. *mechanics*]: in *nat. science,* the mechanics of water and fluid in general; hydrostatics, hydrodynamics, and hydraulics are branches of hydromechanics.

HYDROMEL, n. *hī'drō-mĕl* [Gr. *hudōr,* water; *meli,* honey]: honey mixed in water, called mead when fermented.

HYDROMETALLURGY, n. *hī-drō-mĕ-tăl'ĕr-jĭ* [prefix *hydro-;* Eng. *metallurgy*]: the wet process of extracting metals from ores, in distinction to the hot process.

HYDROMETAMORPHISM, n. *hī-dro-mĕt-a-mawrf'ĭzm* [prefix *hydro-;* Eng. *metamorphism*]: in *geol.,* metamorphism produced mainly by the operation of water, as opposed to pyrometamorphism, effected chiefly through the action of fire.

HYDROMETEOR, n. *hī-dro-mē'tē-ĕr* [prefix *hydro-;*

Eng. *meteor*]: a meteor produced by water in some form, the term meteor being used in its original sense of anything seen in the air as distinguished from the ground.

HYDROMETER, n. *hī-drŏm'ĕ-tėr* [Gr. *hudōr*, water; *metron*, a measure]: an instrument for ascertaining the density, strength, etc., of liquids. HY'DROMET'RIC, a. *-drō-mĕt'rĭk*, or HY'DROMET'RICAL, a. *-rĭ-kăl*, pertaining to a hydrometer. HYDROM'ETRY, n. *-drŏm'ĕ-trĭ*, the art of ascertaining the density, etc., of liquids: see AEROMETER. HYDROMETRIC-PENDULUM, n. a current-gauge. An instrument consisting of a ball suspended from the centre of a graduated quadrant, and held in a stream to mark by its deflection the rate of motion of the water.

The hydrometer is founded on the following principles: When a solid body floats in a liquid, and displaces a quantity of the liquid, it is supported by the same upward pressure that formerly supported the liquid which it displaced. The weight of the solid body is thus equal to the weight of the liquid that it displaces. Hence, the depth to which the same solid body is immersed in a liquid is greater as the density of the liquid is less, and less as the density of the liquid is greater. And, likewise, the weights required to immerse a given body equally deep in various liquids are inversely proportional to the densities of the liquids.

HYDROMETRA, n. *hī'drō-mē'tră* [Gr. *hudōr*, water; *mētra*, womb]: an excessive secretion and accumulation of fluid within the cavity of the uterus.

HYDROMETRA, n. *hī-drŏm'ē-tra* [prefix *hydro-*; Gr. *metron*, a measure]: typical genus of the family *Hydrometridæ*, a family of Heteroptera, tribe *Geocorizæ* (land bugs). It seems like a contradiction in terms to name the genus from the water and the tribe from the land, but the *Hydrometridæ* do not swim like the water-bugs, they only walk on the surface of the water by means of their long legs.

HYDROMETROGRAPH, n. *hī-dro-mĕt'ro-grăf*: instrument for determining and recording the amount of water issuing from a pipe, etc., in a given time.

HYDROMYS, *hī'drō-mĭs*: genus of rodent quadrupeds, of the family *Muridæ*, of which there are only two known species, very similar to one another, natives of Tasmania. They have two incisors and four molars in each jaw. They are called BEAVER-RATS in Tasmania; are nocturnal and very shy; inhabit the banks of both fresh and salt water, and swim well. The largest species is twice the size of a rat. One has the belly white, the other yellow.

HYDRONEPHROSIS, n. *hī'drō-nĕf-rō'sĭs* [Gr. *hudōr*, water; *nephros*, kidney]: dropsy of the kidney, caused by any permanent obstruction of the ureter.

HYDRONETTE, n. *hī'drō-nĕt* [Gr. *hudōr*, water]: a garden implement for watering flowers.

HYDROPATHY, n. *hī-drŏp'ă thĭ* [Gr. *hudōr*, water; *pathos*, feeling]: the water-cure. HYDROPATHIC, a. *hī'drō-păth'ĭk*, relating to. HYDROP'ATHIST, n. *-ă-thĭst*, one who practices the water-cure. — HYDROPATHY, or HYGIENIC MEDICINE, is popularly termed the WATER-CURE. For the bath in general, as a means of preserving health, see BATH —BATHING. We have here to speak of water in its manifold uses in the cure of disease, and as a principal element in that combination of hygienic appliances pertaining to hydropathy as at present practiced. [This is here set forth by an adherent of the system.]

The efficacy of water, in the cure of numerous forms of disease, has long been recognized. Water was largely employed by Hippocrates, the 'Father of Medicine,' more than 2,300 years ago, in the treatment of many kinds of disease; and with a regulated diet, and an implicit belief in the *vis medicatrix naturæ*, it appears to have formed the chief among his medical appliances. Horace has enshrined the memory of Antonius Musa, the hydropathic physician of Emperor Augustus (Epist. i. 15). Both Celsus (about B.C. 50), and Galen (2d c.), speak favorably in their writings of the use of water in the cure of disease, regarding it as of high value in the treatment of acute disorders, particularly fevers. Through the middle ages, likewise, many physicians of name, including Actius and Paulus Ægineta, and the more celebrated Paracelsus, were advocates of the remedial virtues of water; all, however, having faith in its uses in the treatment rather of acute than of chronic disorders. In 1723, Nicolo Lanzani, Neapolitan physician, published a learned treatise on the subject. In Britain, about the beginning of the 18th c., Sir John Floyer and Dr. Baynard made large use of water. Their joint work, *Psychrolousia*, or the 'History of Cold Bathing, both Ancient and Modern,' is replete with quaint learning and practical shrewdness and sagacity. But the most able and scientific among the older treatises in England on the subject of the water treatment, is the work of the well-known Dr. Currie (q.v.), biographer of the poet Burns, published 1797, entitled *Medical Reports on the Effects of Water, Cold and Warm, etc.* In this work, Dr. Currie recommends the cold affusion in typhus and other fevers, and gives practical directions in regard to the cases and the times when it may be used with advantage. Eminent physicians of the present day have admitted that these views, so far as they went, were as scientific in principle as they were novel; but the practice founded on them was considered too dangerous by Currie's contemporaries, and fell into speedy neglect. It is worthy of remark, that Currie appears to have limited his use of water to acute ailments exclusively.

Thus, till the beginning of the present century, by some of those who employed water as a curative agent, it was used in the treatment of acute, and by others of chronic diseases; by some as an internal agent alone, by others as an external application in the various forms of the bath, but never in all the manners combined. This combina-

tion was effected first by the orignal genius of Vincenz Priessnitz, a Siliesian farmer, with whom began a new era for the water-cure. It was owing, we are told, to his successful treatment of more than one bodily injury which he had sustained in his own person that, about 1820, Priessnitz became so fortified in his convictions as to the curative powers of water as to devote himself to employ it medically in the cure of others. Beginning with the external application of water for trifling diseases among the poor of his neighborhood, he gradually undertook an extended range of cases, and multiplied the modes of administration, introducing the wet compress, the douche bath, partial baths of all kinds, the sweating process, the wet sheet, together with copious drinking of pure water. In addition to water in all these forms, he insisted on the value of exercise, diet, fresh air, and mental repose, in the cure of disease; thus practically calling to his aid the entire resources of hygiene, and establishing by a simple, yet thoroughly original combination, nothing less than a new system of medical treatment. As to the success which attended Priessnitz's practice, it is a historical fact that of 7,500 patients, who had gone to Gräfenberg for advice and treatment, to the year 1841, or within about 20 years, there had been only 39 deaths, and some of these, according to the registry of the Austrian police, 'had died before commencing the treatment, while some others were reported in a forlorn state before anything was attempted.' It is to be regretted, however, that the founder of the new system was not himself an educated physician, so that he could have understood better the philosophy of his own practice, and explained it more correctly. He would not have called his system the 'Water cure,' a name scientifically one-sided and incomplete, and therefore misleading. It is equally to be regretted that many of the immediate followers of Priessnitz, while destitute of his remarkable sagacity and genius, should have been no better furnished than himself with scientific knowledge of disease and general professional culture.

In spite of all drawbacks, however, the undoubted merits of hydropathy at length called to its defense many men of standing in the profession, who, allowing for some of its early extravagances, stood forth to explain it scientifically, and pressed it on the acceptance of their brethren; and from their advocacy has sprung up in England and America a school of hydropathic physicians, the philosophy of whose plan of treatment we shall now briefly describe.

Physiology teaches, that the various organs of our bodies cannot be kept in a healthy state without the observance of certain regulations called the primary 'Laws of Health.' When these are broken, the result to the offender is disease in one of it smany forms. Until the appearance of hydropathy, physicians attempted to correct the evil thus caused—and the great majority do so still—by the administration of one or other of the drugs which go to form the medical repertory known as the pharmacopœia; and the argument on which this practice has been based is the very simple

one, that experience has proved the medicine or medicines to be efficacious in a large proportion of similar cases. Hydropathy proceeds according to a very different method. Taking as his central maxim the principle first propounded by Hippocrates, that it is nature's own strivings after health (*vis medicatrix naturæ*) that really cure the patient when he is cured, the function of art being mainly to remove obstacles, the hydropathic physician avoids using all means with whose effects he is not thoroughly conversant, or which may, at least, interfere with nature's own operations. Hence, as a rule, he eschews the use of drugs, and betakes himself to those more simple natural agents which, in their totality, receive the name of hygiene. The conditions of health, as unfolded by physiology, may be briefly stated to consist of five necessary requirements—air, exercise, water, diet, and nervous repose. These are undeniably essential to the preservation of health; no human being can possibly continue in a fair state of health when deprived of the just proportion of any one of them. This proposition which may be regarded as axiomatic, forms the starting point of hydropathy in the cure of disease. Admitted that certain agencies are necessary to the preservation of health, the hydropatic principle is simply this, that the very same agencies, infinitely modified of course according to the requirements of each particular case, and generally much intensified, are not only the safest, but by far the surest means of curing chronic disease; or, to put it more correctly, are the best means which can be brought to nature's assistance for enabling her to effect a cure herself.

Here it is proper to explain what is meant by saying that the natural agents of health are *intensified* when they are used, not for the preservation of health, but the cure of disease; or, in other words, when we pass from natural hygienics to natural therapeutics. Take the element of exercise, for instance, one of the most powerful hydropathic agencies. Every one knows, although but few act systematically on the knowledge, that a certain amount of exercise is necessary to maintain the body in health; the hydropathic doctrine, accordingly, is that in the cure of chronic disease, this exercise must be intensified—increased to the full extent which the patient's strength will warrant. So, again, as to the use of water: a certain amount of pure water, used externally and internally, is also necessary to the maintenance of health; hydropathically, a much more liberal use of the same element in both ways is necessary to the cure of disease. Special attention should be given to this, which in fact is the very kernel of the hydropathic theory.

Let us now explain more in detail how and in what cases hydropathy employs the agents on which it relies. Diseases may, for general purposes, be divided into two great classes: those in which the physician is called on to lower or *reduce* to the standard of health; and those in which the object of his endeavors is, on the other hand to assist in *elevating* to the same standard. In the former category.

range themselves all those diseases which are marked by a plethoric or inflammatory type—by an overplus of mal-directed strength in the economy; in the latter, those distinguished by a corresponding diminution in the vital powers. It may be truly affirmed, that to rectify both these abnormalities, and to restore the equilibrium of health, is the great object of medical treatment. The ordinary practice seeks to achieve this object mainly, in both instances, by means of drugs, respectively adapted to the two classes, and tending to lower in the one case and to exalt in the other. The hydropathic practice, with the same object in view, employs, as already stated, the natural remedies—air, exercise, water, diet, and repose.

Thus, in dealing with acute and plethoric complaints, and the whole order of diseases ranging themselves under the former of the divisions just indicated (i.e. in which *reduction* to the standard of health is demanded), water is the element which enacts by far the most conspicuous part; and the application of it most serviceable in these cases is the *wet sheet* or *pack*. Indeed, the discovery by Priessnitz of this application of water was perhaps the most important contribution which he made to the new system of which he was the practical founder, inasmuch as it at once supplied one of the most powerful and at the same time one of the safest methods of combating almost every form of acute disease. This, the most distinctive of hydropathic appliances, may be thus described: Over the mattress of a bed or sofa is extended a stout blanket, and on this is spread a linen sheet, well wrung out of cold water, so that it is only damp. On this the patient is laid, and immediately enveloped tightly with a heavy weight of blankets upon him, tucked in so closely as to completely exclude all air. The body's natural heat acting on the damp linen, generates vapor almost immediately, and the patient forthwith finds himself, not in a cold, but in a comfortably warm vapor bath—in a novel, but by no means unpleasant form of body poultice. The effects of this process on the economy seem plain enough. It is clear, in the first place, that the pores of the skin, so numerous and performing so important a function, must thereby be thoroughly cleansed, and the blood itself depurated; with the equalization of temperature over the entire surface of the body, will follow a corresponding equalization in the distribution of blood through out the system, thereby relieving internal congestions wherever occurring; and lastly from the soothing effects on the nervous system, and the allaying of all irritation, must result not only the alleviation of pain, but that lowering of the heart's action, and with it of the circulation of the blood, of such incalculable importance in the treatment of many forms of disease, and especially of fevers. Such is the wet sheet.

Of the same order of remedy, though in many respects very different from it is the Turkish bath, recently introduced into w. Europe and N. America, and now fairly established. In this bath the hydropathic procedure has received a most important auxiliary in the treatment of many

forms of disease, but in an especial manner of the kind now particularly under consideration, such as gout, rheumatism, bronchitis, and other complaints of an inflammatory or febrile character. The same end of diaphoresis, or sweating, is secured, though not so efficiently, by means of the vapor bath as used by the Russians, and by hot air as generated by the spirit-lamp. The latter has the advantage of being less expensive, and the bather not being required to breathe the heated air, many persons can use it who would be quite unable to respire, without faintness, the highly heated atmosphere of the Turkish bath. In addition to the above, must be mentioned the use of warm fomentations, in the form of flannels wrung out of boiling water—a kind of application much relied on for subduing local pain proceeding from whatever cause, for relieving congestion, and abating and checking inflammation. So much for the principle hydropathic operations employed to treat acute and inflammatory diseases—processes corresponding in their aims and effects to antiphlogistic, diaphoretic, and sedative drugs.

We have now to speak of the hydropathic agents brought to bear on the second great division of maladies, wherein the object is not to lower, but to elevate, to the standard of health. In the former class of cases, it was stated that water was the agent most prominently brought forward, and it is in such diseases alone that the term 'water-cure' is at all appropriate. In those to which we now refer, water certainly acts an important part in the cure, but only in combination with good air, exercise, regulated diet, and nervous repose. As an illustration: A cold bath is given in the usual way as a tonic. Its effects are admirable under certain conditions—the first and chief of these being that a good reaction takes place; that the blood, which had been driven by the constringent effects of the cold water from the surface of the body into the inner parts, should return in increased force when the stimulus of cold is withdrawn. But to this end, in all but very strong persons exercise immediately after the bath is indispensably necessary, and must follow it as a matter of course, or the bath cannot be administered with comfort, or even with safety. As much might be said for the co-operative importance of pure air, of diet, and of nervous repose, all of them, if necessary to the preservation of health, then of tenfold importance in the cure of disease. Thus the highly tonic properties of the bath, administered in its various forms, and followed by a due proportion of exercise, especially in strong bracing air, produce at once a marvellous effect in sharpening the appetite and improving the powers of digestion, so that, if simple and nourishing diet is administered, better blood will be elaborated, and, consequently, every tissue of the body be more highly nourished and invigorated. In all cases, this is and must always be a gradual process, for it is evident that the treatment, whether in reference to exercise, diet, or the use of the stimulus of water, must bear an accurate relation to the invalid's strength. Little by little, however, and in most cases much

more rapidly than might be expected, improvement begins. From the great action brought to bear on the skin by the different applications of water, the prudent use of the Turkish bath, and the effects of full exercise, a rapid change of the particles of the body takes place—so rapid, that, according to Liebig, 'by means of the water-cure treatment, a change of matter is effected in a greater degree in six weeks, than would happen in the ordinary course of nature in three years'—while the effete matter thrown off is replaced by the more healthful materials supplied to the economy by an improved quality of blood, itself the result of an improved digestion, and this, again, resulting from the heightened *vis vitæ* which the combined hydropathic agencies have produced. The forms of the bath may of course be varied *ad infinitum*, as well as its power according to the temperature of the water. The baths most in vogue in daily practice are technically denominated the *Wash down*, *Dripping sheet*, *Shallow*, *Sitz bath*, and *Douche*, together with the *Pack*, or *Wet sheet* above mentioned; in addition to which there is a catalogue of local applications, too extensive to enumerate. These various appliances of water are capable of producing extraordinary effects on the economy, constituting, as they do, especially when conjoined with exercise, the most powerful tonics, and, at the same time, the most safe and agreeable, that can be brought to bear on the body. It might truly be added that, in the treatment of chronic disease, this same element, water, is capable of becoming, according to the manner and quantity of its use, internally and externally, an alterative, derivative, diuretic, and diaphoretic. It is as a tonic and stimulant, however, that its virtues are most conspicuous, and most called into requisition for the cure of chronic ailments.

From a variety of circumstances, the system of hydropathic medicine has been greatly misunderstood and misjudged by the general public. For one thing, the name of 'water cure,' or 'hydropathy,' adopted by Priessnitz, has been very prejudicial, as leading to the false inference that the one element of water alone constitutes the bone and marrow of the system, playing the part of a panacea for every form of human ailment. Such a notion has never been maintained by the practitioners of scientific hydropathy, and it is matter of regret that some more comprehensive and catholic title, as that of 'hygienic medicine,' has not long since been adopted. As it is, the prejudice against the system is gradually giving way; it is no longer treated as heresy by the orthodox profession; and many enlightened practitioners are in the habit of sending certain classes of their patients to hydropathic establishments, and even subject themselves to the treatment. In fact, the tendency of ordinary medical practice has of late years been toward the principles on which hydropathy is based. A manifest disposition exists on the part of the more enlightened members of the profession to rely much less on art and much more on nature in the treatment of diseases of every type, but especially those of chronic character; and as the

practitioners of scientific hydropathy by no means exclude the use of drugs, when drugs appear necessary, a convergence of opinion seems really coming about.

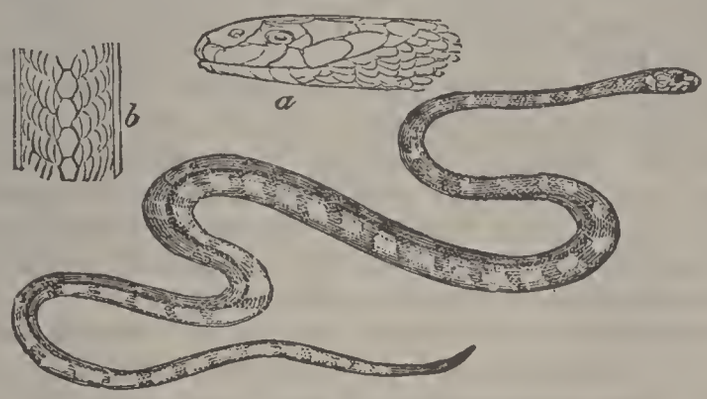
Hydropathy, hitherto, has been practiced almost exclusively in large establishments, presided over by competent medical men, and dedicated to a thorough and systematic carrying out of the principles on which the system of cure is founded. There can be no question that this is by far the most complete and satisfactory arrangement when it can be accomplished. But the power of leaving their daily work for the purpose of seeking health, is given to very few; and if the hydropathic treatment were to be absolutely limited to its chosen retreats in the country, and incompatible with the business and work of town-life, it would be shorn of half its utility as a remedy, and be a luxury to which only the rich and disengaged could aspire. But exercise, morning and evening, can usually be had by most persons. The same applies to the systematic and persistent use of the bath, to the regulation of diet, and the observance of early hours. By these means, even without country air and other hygienic adjuncts, no doubt much might be done both for cure of disease and for preservation of health. Toward effecting the latter object, at least, no one will deny the immense value of hydropathy. No one, having any practical acquaintance with it, can doubt its influence in the promotion of those habits of temperance, cleanliness, self-denial, and general obedience to the laws of health, which, while they tend so much to the happiness of the individual, tend no less to secure the strength and prosperity of nations. Those who would inquire further into the subject, may consult the work of Dr. Gully, *The Water-cure in Chronic Disease;* that of Dr. James Wilson, *Principles and Practice of the Water-cure;* the several works of Dr. Edward Johnson; and Dr. Lane's treatise, *Hydropathy, or Hygienic Medicine.*

HYDROPERICARDIUM, n. *hī'drō-pĕr-ĭ-kâr'dĭ-ŭm* [Gr *hudōr*, water; *peri*, round about; *kardĭă*, the heart]: an effusion of serum into the sac of the pericardium or membrane inclosing the heart; dropsy of the pericardium.

HYDROPHANE, n. *hī'drō-fān* [Gr. *hudōr*, water; *phainō*, I show]: a variety of opal, pearly opaque when dry, but rendered translucent when saturated with water. HYDROPH'ANOUS, a. *-drŏf'ă-nŭs*, made translucent by water.

HYDROPHID Æ, *hī-drŏf'ĭ-dē:* family of water-serpents, sometimes defined to include numerous fresh-water snakes not venomous, and sometimes limited to venomous sea-serpents, inhabiting the Indian, Chinese, and tropical Australian seas. These sea-serpents, forming the genus *Hydrophis* (or *Hydrus*), and other genera recently separated from it, have the tail compressed and the belly keeled, so that they have the power of swimming like eels; they have small heads and small eyes; they are remarkable for the large size of their nasal shields; they are generally of yellowish-green color, varied with blackish rings or lozenge-shaped spots.

Their lungs are often prolonged into a reservoir of air as far as the commencement of the tail. They are often from two to five ft. long. They are frequently seen asleep on the surface of the sea, and are easily caught in this condition, in which, apparently, they often fall a prey to sharks. They



Banded Sea Snake (*Chersydrus Fasciatus*):
a, head ; *b*, part of back.

are supposed to live on small fishes and crustaceans. They are sometimes found coiled up among sea-weed on the shore, and are much dreaded by fishermen. In some places they are very numerous. One species, at least, is esteemed good food by the Tahitians. More than 50 species are known.

HYDROPHILIDÆ, *hī-drō-fil'ĭ-dē:* water-beetles; family of pentamerous beetles, more truly aquatic than the allied Helophoridæ. The body is oval, or somewhat rounded, sometimes almost globose. Though the larvæ are carnivorous, the developed insect feeds on vegetable matter in decay: see COLEOPTERA.

HYDROPHITE, n. *hī'dro-fīt* [prefix *hydro-;* Gr. *ophis,* a serpent, a snake]: green translucent or opaque mineral, of sub-vitreous lustre, occurring massive or in fibrous crusts; found at Taberg in Smäland, in Sweden, and in Orange co., N. Y.; called also Jenkinsite.

HYDROPHOBIA, n. *hī'drō-fō'bĭ-ă* [Gr. *hudōr,* water; *phobos,* fear, dread]: a preternatural dread of water; a dreadful and almost incurable disease generally caused by the bite of a rabid dog. HY'DROPHO'BIC, a. *-fō'bĭk,* pertaining to dread of water or to canine madness.

HYDROPHOBIA, *hī-drō-fō'bĭ-a:* one of the diseases produced by animal poisons. A person is bitten by a mad dog or other animal. The wound gradually heals in the ordinary manner. After an uncertain interval, usually ranging from six weeks to eighteen months, termed the period of *incubation,* the following symptoms appear: The patient experiences discomfort or pain at the seat of the bite. The cicatrix tingles, or feels stiff or numb; sometimes becomes swelled and livid, and occasionally reopens, and discharges a peculiar ichor. The morbid sensations gradually extend from the original seat of injury toward the trunk. This period is termed the stage of *recrudescence.* Within a few hours, or, at longest, a very few days after the exhibition of this local irritation, during which time the patient has a sense of general discomfort and illness, the

specific constitutional symptoms begin to manifest themselves; he complains of pain and stiffness about the neck and throat, finds himself unable to swallow fluids, and every attempt to do so—often even the sight or the sound of fluids—brings on a terrible paroxysm of choking and sobbing; and this continues two or three days, till the patient dies from pure exhaustion. The passage of a gust of wind across the face, or the waving of a mirror before the eyes, is often sufficient to excite these paroxysms. The mental condition in the last stage of this disease varies; the patient may be calm and tranquil; generally he is irritable and apprehensive, and suspicious; and in most cases, a certain degree of delirium, or even mania, is associated with irritability. Death usually takes place on the second or third day after the commencement of the specific symptoms.

Some medical writers have maintained that H. may occasionally be spontaneously developed in man, as is undoubtedly the case occasionally in the lower animals, e.g., the dog and wolf; but even if this ever occurs, the instances are so extremely rare as not to affect the general statement, that in man the disease is the result of an animal poison, communicated usually by the bite of a dog, but which has been produced also by the bite of the wolf, jackal, raccoon, and cat. The poisonous saliva is perfectly innocuous when applied to the unbroken skin; to produce its effects, there must be some abrasion of the cuticle. It has, however, been maintained that the poison may enter the system by mere contact with the mucous membrane; and that the disease has been caused by the *scratch* of a cat. In the latter case, the poisonous saliva might have come from the mouth on to the claws.

Till of late H. was considered incurable; the development once begun, could not be checked. At most, the distressing symptoms could be alleviated by chloroform, opiates, and the copious use of the hot-air bath. But since 1885, M. Pasteur, of Paris, claims not merely to have succeeded in rendering dogs or other animals safe against the bites of rabid animals by the careful and repeated injection of attenuated virus (see RABIES), but also that by the inoculation of men with such virus, even after they have been bitten by rabid animals, he can anticipate the slow incubation of the disease caused by the bite, and by producing quickly a mild form of disease, wholly prevent the deadly and distressing illness. Numerous patients were treated 1885,6; and with success, it is affirmed, wherever the conditions were favorable.

The success of the method was disputed; and though numerous operations by Pasteur have since done much to authenticate it, so that it has recently gained large scientific and popular advocacy, it is still desirable that the first development of the disease should be prevented by early and complete excision of the bitten part, provided the situation of the bite allows the free use of the knife. 'If,' says Dr. Watson, 'the injury be so deep or extensive, or so situated that you cannot remove the whole surface of the wound, cut away what you can: then wash the wound thoroughly

and for some hours together, by means of a stream of warm water, which may be poured from a tea-kettle; place an exhausted cupping-glass from time to time over the exposed wound; and finally apply to every point of it a pencil of lunar caustic. If you cannot bring the solid caustic into contact with every part, you had better make use of some liquid escharotic; strong nitric acid, for example.' Early excision is the only sure preventive, but if, for any reason, the operation has been omitted in the first instance, it is advisable for the reasons already given regarding the probable latency of the poison, to cut out the wound at any period before symptoms of recrudescence appear. The reason why many neglect to have immediate recourse to excision probably is, that hydrophobia is not certain to follow the bite of a rabid animal. John Hunter states that he knew an instance in which, of 21 persons bitten by a mad dog, one alone was infected. On the other hand, we have evidence that of 114 persons bitten by rabid wolves, 67, or more than one-half, were victims to this disease. Although we have no trustworthy evidence on a large scale, there is no doubt that the majority of persons who are bitten by a mad dog do escape the disease, even without taking any precaution.

HYDROPHTHALMIA, n. *hī-drŏf-thăl'mĭ-ă* [Gr. *hudōr*, water; *ophthal'mos*, an eye]: dropsy of the eye.

HYDROPHYLLACEÆ, *hī-drō-fĭl-lā'sē-ē:* natural order of exogenous plants, containing about 80 known species, natives chiefly of the colder parts of America. None are of importance for any use; though *Hydrophyllum Canadense* has been reputed in N. America a remedy for snake bites, and the leaves of *H. Virginicum*, or Shawanese Salad, are eaten by the Indians, both raw and boiled; but some of them are favorite ornaments of flower-borders, particularly different species of *Nemophila*. The order includes some small trees and bushes as well as herbaceous plants. They are often hispid, like the *Boraginaceæ*.

HYDROPHYLLIA, n. plu. *hī'drō-fĭl'lĭ-ă* [Gr. *hudra*, a water-snake; *phullon*, a leaf]: in *zool.*, overlapping appendages or plates which protect the polypites in some of the oceanic Hydrozoa; also termed 'bracts.'

HYDROPHYTE, n. *hĭ'drō-fīt* [Gr. *hudōr*, water; *phŭtŏn*, a plant]: a plant which lives and grows in water. It may be wholly submerged, completely without roots, and derive its sustenance wholly from the water; or may live amphibiously, rooted in soil and lifting some or all of its leaves into the air, and so differ only in a greater or less degree from land plants.

HYDROPSY, n. *hī'drŏp-sĭ* [Gr. *hudrōps*, the dropsy; *hudrōpĭkŏs*, relating to dropsy—from *hudōr*, water]: dropsy—*dropsy* being but a contraction of *hydropsy*. HYDROP'IC, a. *-drŏp'ĭk*, or HYDROP'ICAL, a. *-ĭ-kăl*, resembling dropsy; dropsical. See DROPSY.

HYDROPULT, n. *hī'drō-pŭlt* [Gr. *hudōr*, water; *paiō*, I hurl or toss (see CATAPULT)]: a garden implement for watering flowers.

HYDRORHIZA, n. *hī'drō-rī'zā* [Gr. *hudra*, a water snake; *rhiza*, a root]: in *zool.*, the adherent base or proximal extremity of any hydrozoon.

HYDRO-SALTS, n. plu. *hī'drō-sawlts* [Gr. *hudōr*, water]: salts, the acid or base of which contains hydrogen.

HYDROSCOPE, n. *hī'drō-skōp* [Gr. *hudōr*, water; *skŏpĕō*, I view]: an instrument for measuring the dampness or moisture of the air, or of any other gas.

HYDROSOMA, n. *hī'drō-sō'mă* [Gr. *hudra*, a water-snake; *sōmă*, body]: in *zool.*, the entire organism of any hydrozoon.

HYDROSTATICS, n. plu. *hī'drō-stăt'ĭks* [Gr. *hudōr*, water; *stătikos*, standing or settling]: the science which treats of the properties of fluids when at rest—namely, their weight, pressure, and equilibrium, particularly of water. HY'DROSTAT, n., general term, signifying an apparatus or contrivance to prevent the explosion of steam-boilers. HY'DROSTAT'IC, a. *-ĭk*, or HY'DROSTAT'ICAL, a *-ĭ-kăl*, of or relating to the properties of water while at rest. HY'DROSTAT'ICALLY, ad. *-ĭ-kăl-lĭ*. HYDROSTATIC BALANCE, a balance employed to weigh bodies in water in order to determine their specific gravity. HYDROSTATI'CIAN, *-sta-tĭ'shŭn*, one versed or skilled in hydrostatics.

HYDROSTATICS, *hī-drō-stăt'ĭks:* science which treats of the weight and equilibrium of liquids, and of their pressure on the walls of vessels containing them. The science depends on the way in which the molecules of a liquid form a mass under the action of gravity and molecular attraction, the latter of which is so modified in liquids as to give them their state of liquidity. Though the particles of a liquid cohere, they are free to slide upon one another without the least apparent friction; and it is this perfect *mobility* that gives them the mechanical properties considered in hydrostatics. The liquid usually under consideration is water, but the principles are of similar application to other liquids.

The fundamental property may be thus stated: WHEN A PRESSURE IS EXERTED ON ANY PART OF THE SURFACE OF A LIQUID, THAT PRESSURE IS TRANSMITTED UNDIMINISHED TO ALL PARTS OF THE MASS, AND IN ALL DIRECTIONS. Most of the other propositions of H. are only different forms or direct consequences of this truth. This is a physical axiom, but its truth may be experimentally proved. Suppose a close box B filled with water, and having a tube *a* inserted into the upper cover, of an inch in area, and with a plug or piston fitting into it. If the piston *a* is now pressed down on the water with a force equal to a pound weight, the water, being unable to escape, will react on the piston with the same force; but it obviously will not press more against *a* than against any other part of the box, therefore every sq. inch of the interior surface

of the box is pressed outward with the force of a pound. If, then, there is another tube inserted in any part of the box with a plug of the same area, as at *b*, it will require a force of a pound to keep this plug in its place. (We leave out of account at present the pressure on *b* arising from the *weight* of the water in the box above it, and consider only the pressure propagated by the forcing down of the plug *a*.)

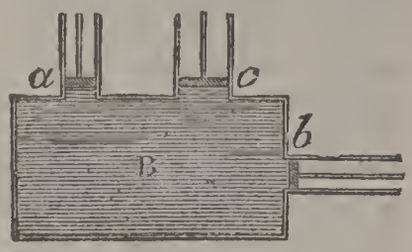


Fig. 1.

However many plugs of the same size there were, each would be pressed out with the same force of a pound; and if there were a large plug of four times the area, as at *c*, it would be pressed out with a force of four pounds. We have only, then, to enlarge the area of the piston *c* to obtain any multiplication of the force exerted at *a*. If the area of *c* is 1,000 inches, that of *a* being one inch, a pressure of one pound on *a* becomes a pressure of 1,000 pounds on *c*; and if we make the pressure on *a* one ton, that on *c* will be 1,000 tons. This seemingly wonderful multiplication of power has received the name of the *hydrostatic paradox*. It is, however, nothing more than what takes place in the lever, when one pound on the long arm is made to balance 100 pounds on the short arm.

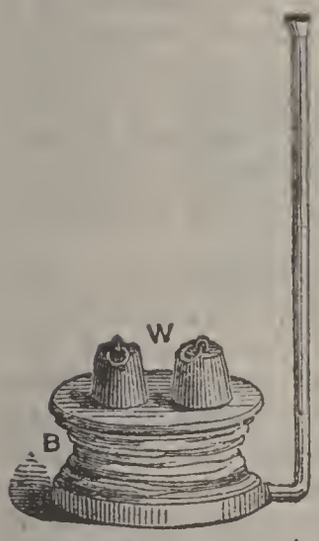


Fig. 2.

If the pressure which we have supposed exerted on the piston *a* arose from a pound of water poured into the tube above it, it would continue the same though the piston were removed. The pound of water in the tube is then pressing with its whole weight on every sq. inch of the inner surface of the box—downward, sidewise, and upward. The apparatus called the *hydrostatic bellows* acts on this principle (see fig. 2). It consists of two stout circular boards connected by leather in the manner of a bellows, B. The tube A is connected with the interior; and a person standing on the upper board, and pouring water into the tube, may lift himself up. If the area of the upper board is 1,000 times that of the tube, an ounce of water in the tube will support 1,000 ounces at W. It is on the same principle that the Hydraulic Press (q.v.) depends.

1. *Equilibrium of Liquids.*—After this explanation of the fundamental properties of liquids, it may be enough to state the two conditions of fluid equilibrium which directly flow from it. (1) Every molecule of the liquid must be solicited by equal and contrary pressures in every direction. This is a corollary from liquid mobility. (2) The upper molecules of a liquid, which are free, must form a surface perpendicular to the impressed force. The truth of this will sufficiently appear from the proof, that the sur-

face of a liquid at rest under gravity must be what is called horizontal. It can be shown to be a consequence of the primary property of 'pressing equally in all directions.' For let *da* and *cb* be vertical lines, or lines in the direction of gravity; and *ab* a plane at right angles to that direction, or horizontal. A particle of the liquid at *a* is pressed by the column of particles above it from *a* to *d*; and the like is the case at *b*. Now, since the liquid is at rest, these pressures must be equal; for if the pressure at *b*, for instance, were greater than at *a*, there would be a flow of the water from *a* toward *b*. It follows that the line *ad* is equal to *bc*, hence that *dc* is parallel to *ab*, therefore horizontal. The same might be proved of any two points in the surface; therefore the whole is in the same horizontal plane.

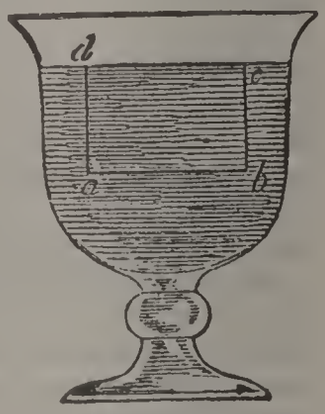


Fig. 3.

2. *Pressure of Liquids on Surfaces.*—The general proposition on this point may be stated thus: *The pressure of a liquid on any surface immersed in it, is equal to the weight of a column of the liquid whose base is the surface pressed, and whose height is the perpendicular depth of the centre of gravity of the surface below the surface of the liquid:* see article CENTRE OF PRESSURE. The pressure thus exerted is independent of the shape or size of the vessel or cavity containing the liquid.

3. *Buoyancy and Flotation.*—As a consequence of the proposition regarding the pressure of liquids on surfaces, it can be shown that when a solid body is immersed in a liquid, it loses as much weight as that of an equal bulk of the liquid weighs. It follows that, if a cubic ft. of the liquid and of the solid have equal weights, the solid will lose all its weight, or will remain in the liquid wherever it is put; if a cubic ft. of the liquid weigh more than one of the solid, the solid will not only lose all its weight, but will rise up, and that with a force equal to the difference; if a cubic ft. of the liquid weigh less than one of the solid, the solid will lose weight, but will sink.

When a solid swims, or rises and *floats* on the surface of a liquid, the next problem of H. is to determine how much of it will be below the surface. We have already seen that any solid in a liquid is pressed upward with a force equal to the weight of the water whose room it occupies. Now, a floating body must be pressed up with a force equal to its own weight, otherwise it would sink lower; hence, *a floating body displaces its own weight of the liquid.* A solid, as AB in fig. 4, sinks until the space occupied by the part B immersed would contain an amount of water equal in weight to the whole solid AB.

Fig. 4.

As the buoyancy of a body thus depends on the relation

between its weight and the weight of an equal bulk of the liquid, the same body will be more or less buoyant, according to the density of the liquid, in which it is immersed. A piece of wood that sinks a ft. of water, will sink barely an inch in mercury. Mercury buoys up even iron. Also a body which would sink of itself, is buoyed up by attaching to it a lighter body; the bulk is thus increased without proportionally increasing the weight: this is the principle of life-preservers of all kinds. The heaviest substances may be made to float by shaping them so as to make them displace more than their own weight of water. A flat plate of iron sinks; the same plate made concave like a cup or boat, floats. It is to be noted that the buoyant property of liquids is independent of their depth or expanse, if there be only enough to surround the object. A few pounds of water might be made to bear up a body of a ton weight; a ship floats as high in a small dock as in the ocean.

4. *Stability of Floating Bodies.*—Conceive *abd* (fig. 5) to be a portion of a liquid turned solid, but unchanged in

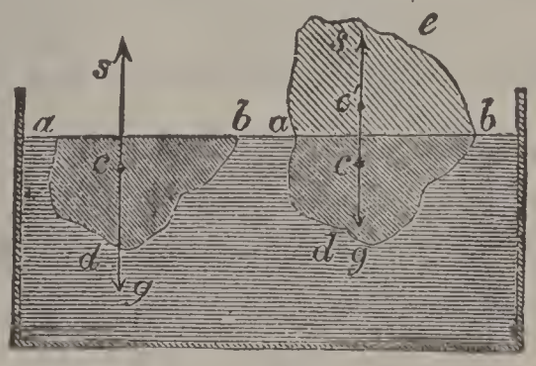


Fig. 5.

bulk; it will evidently remain at rest, as if it were still liquid. Its weight may be represented by the force *cg* acting on its centre of gravity *c*; but that force is balanced by the upward pressure of the water on the different parts of the under surface; therefore, the resultant of all these elementary pressures must be a force, *cs*, exactly equal and opposite to *cg*, and acting on the same point *c*, for if it acted on any other point, the body would not be at rest. Now, whatever other body of the same size and shape we suppose substituted for the mass of solid water *abd*, the supporting pressure or buoyancy of the water around it must be the same; hence we conclude, that *when a body is immersed in a liquid, the buoyant pressure is a force equal to the weight of the liquid displaced, and having its point of application in the centre of gravity of the space from which the liquid is displaced.* This point may be called the *centre of buoyancy.*

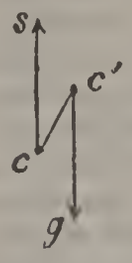


Fig. 6.

We may suppose that the space *abd* is occupied by the immersed part of a floating body *aebd* (fig. 5). The supporting force, *cb*, is still the same as in the former case, and acts at *c*, the centre of gravity of the displaced water; the weight of the body also must be the same; but its point of application is

now c', the centre of gravity of the whole body. When the body is floating at rest or in a state of equilibrium, this point must evidently be in the same vertical line with c; for if the two forces were in the position of cs, $c'g$ (fig 6), they would tend to make the body roll over. The line passing through the centre of gravity of a floating body and the centre of gravity of the displaced water, is called the *axis of flotation.*

The equilibrium of a floating body is said to be *stable*, when, on suffering a slight displacement, it tends to regain its original position. The conditions of stability will be understood from the accompanying figures. Fig 7 represents a body floating in equilibrium, G being its centre of gravity, B its centre of buoyancy, and AGB the axis of flotation, which is of course vertical. In fig. 8 the same body is represented as pushed or drawn slightly from the perpendicular. The shape of the immersed portion being now altered, the centre of buoyancy is no longer in the axis of figure, but to one side, as at B. Now, it is evident, that if the line of direction of the upward pressure—that is, a vertical line through B—meets the axis above the centre of gravity, as at M, the tendency of the two forces is to bring the axis into its original position, and in that case,

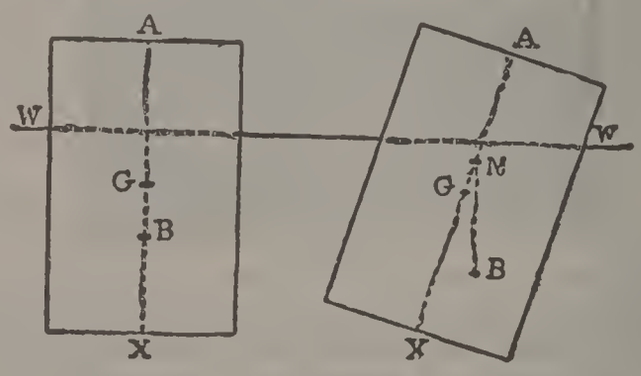


Fig. 7. Fig. 8.

the equilibrium of the body is stable. But if BM meet the axis below G, the tendency is to bring the axis further and further from the vertical, until the body comes into some new position of equilibrium. There is still another case; the line of support or buoyancy may meet the axis in G, and then the two forces counteract one another, and the body remains in any position in which it is put; this is called *indifferent* equilibrium. In a floating cylinder of wood, for instance, B is always right under G, in whatever way the cylinder is turned. When the angles through which a floating body is made to roll are small, the point M is nearly constant. It is called the *metacentre;* and its position may be calculated for a body of given weight and dimensions. In the construction and lading of ships, it is an object to have the centre of gravity as low as possible, in order that it may be always below the metacentre. With this view, heavy materials, in the shape of ballast, are placed in the bottom, and the heaviest portions of the cargo are stowed low in the hold. See SPECIFIC GRAVITY AREOMETER.

HYDROSULPHURET, n. *hī'drō-sŭl'fū-rĕt* [Eng. *hydrogen*, and *sulphur*]: a compound of hydrosulphuric acid with a base. HY'DROSULPHU'RIC, a. *-fū'rĭk*, pertaining to or derived from hydrogen and sulphur.

HYDROSULPHURIC ACID, *hī-drō-sŭl-fū'rĭk* (H_2S), known also as *Sulphuretted Hydrogen, Sulphydric Acid*, and *Hydrothionic Acid:* a colorless gas, of strong and very nauseous odor, resembling that of rotten eggs, consisting of two volumes of hydrogen and one volume of sulphur vapor. It is about 17 times heavier than hydrogen. It is highly combustible, and burns with a pale, blue flame, producing water and sulphuric acid, and, generally, a deposit of sulphur. It has a weak acid reaction, and forms one of the hydracids. Although a feeble acid, it combines readily with bases. Under ordinary atmospheric pressure, sulphuretted hydrogen gas condenses at 80° F. below zero, to a colorless liquid, which freezes to an ice-like solid upon being further cooled to 121° F. below zero. Liquefaction may also be induced at the ordinary temperature of the air by the application of a pressure of from 17 to 20 atmospheres. It is poisonous when inhaled in any considerable quantity, even though largely diluted with air. In Nature, it occurs as a gaseous constituent of many mineral waters—e.g., those of Aix-la-Chapelle in Germany, Barèges in France, Abano in Italy, and Harrowgate in England—and is evolved from fumaroles and volcanoes. It is formed spontaneously wherever sulphurous organic matters are undergoing putrefaction, e.g., in stagnant sewers and cesspools, and in waters charged with organic matter and sulphates, especially sulphate of lime.

There are several ways of preparing the gas for laboratory purposes. The following is most common. Sulphide of iron, in small fragments, is placed in a bottle, and dilute sulphuric acid is added. Water is decomposed, its hydrogen combining with the sulphur of the sulphide to form hydrosulphuric acid, which escapes as a gas, while its oxygen enters into combination with the iron, forming oxide of iron (FeO), which unites with the sulphuric acid to form ferrous sulphate, which remains in solution. The reaction is expressed by the equation:

Sulphide of Iron.		Sulphuric Acid.		Hydrosulphuric Acid.		Ferrous Sulphate.
FeS	+	H_2SO_4	=	H_2S	+	$FeSO_4$

It is an invaluable reagent in the chemical laboratory, where it is greatly used for separating the metals into groups, in inorganic analysis. This is due to the fact that many of the sulphides which it forms with metallic oxides are insoluble in water, and are thrown down from solutions as precipitates with characteristic colors.

HYDROTHECA, n. plu. *hī'drō-thē'kă* [Gr. *hudra*, a water-snake; *thēkē*, a chest]: in *zool.*, the little chitinous cups in which the polypites of many Hydrozoa are protected

HYDROTHERMAL, a. *hī′drō-thėr′măl* [Gr. *hudōr,* water; *thermē,* heat]: of or pertaining to hot water—applied to the action of heated waters in dissolving, redepositing, and otherwise producing mineral changes within the crust of the globe.

HYDROTHORAX, n. *hī′drō-thō-răks* [Gr. *hudōr,* water; *thorax,* the chest]: dropsical collection in the pleura (q.v.), a closed serous sac enveloping the lung on either side. When it exists to any extent, the pressure which it exerts on the lungs impedes the passage of the blood through them, and occasions difficulty of breathing, lividity of countenance, etc.; and more or less dropsy in the face, ankles, etc., soon appears.

The causes of hydrothorax are various. It may depend on inflammation of the secreting membrane, or it may be a consequence of organic disease of the heart or lungs. With regard to treatment when the disease seems to depend on inflammation of the pleura, great advantage may often be derived from occasional cupping and blistering. In order to cause the removal of the fluid in chronic cases resort is had to diuretics, diaphoretics, and purgatives.

HYDROUS, a. *hī′drŭs* [Gr. *hudōr,* water]: containing water. HY′DRURET, n. *-drô-rĕt,* a compound of hydrogen, chiefly with a metal.

HYDROXIDES: compounds containing hydroxyl (q.v.). Often the term is applied specially to the metallic hydroxides, such as those of calcium (slaked lime), $Ca(OH)_2$, or of potassium (caustic potash), KOH, but it is really applicable to all classes of substances which contain the group in question. Some of these classes are given under *Hydroxyl;* amongst others which contain it may be mentioned glycerol (glycerin) and the sugars, which are really alcohols.

HYDROXY ACID: strictly it may be applied to any acid containing hydroxyl, such as sulphuric acid, $O_2S(OH)_2$. It is, however, usually restricted to organic acids which possess one or more hydroxyl groups in addition to their carboxyl groups. The most familiar examples of these acids are lactic acid, $CH_3CH(OH)COOH$, formed when milk sours; tartaric acid, $\begin{array}{l} HC(OH)COOH \\ | \\ HC(OH)COOH \end{array}$, contained in cream of tartar and often in baking powder, and citric acid, $\begin{array}{l} CH_2COOH \\ | \\ HC(OH) \\ | \\ CH_2COOH \end{array}$, the characteristic acid of lemons, oranges and other fruits. The presence of these hydroxy groups confers on the acid the general properties of an alcohol, in addition to its acidic functions. Thus the above acids can all form ETHERS as well as ESTERS (q.v.).

HYDROXYL: the hypothetical, monovalent radical —O—H. Combined with metals it forms the hydroxides, such as sodium hydroxide (caustic soda), NaOH; with alkyl groups it forms the alcohols, such as ethyl alcohol, CH_3CH_2OH; with aryl groups it gives the phenols, such as phenol (carbolic acid), C_6H_5OH. Combined with carbonyl, CO, it gives the carboxyl radical, $—C<^{O}_{OH}$, which is present in all organic acids. Hydroxyl is also assumed to be present in most of the inorganic acids which contain oxygen, such as sulphuric acid, $O_2S(OH)_2$, and phosphoric acid, $OP(OH)_3$, in fact, the basicity (q.v.) of these acids depends on the number of such hydroxyl groups.

HYDROZOA, n. plu. *hī'drō-zō'ă* [Gr. *hudra,* a water-serpent; *zōŏn,* an animal]: in *zool.*, gelatinous polyps organized like the hydra; the class of the Cœlenterata comprising animals constructed like the hydra. See HYDRA; ZOOPHYTES.

HYDRUN'TUM. See OTRANTO.

HYDRURIA, n. *hī-drō'rĭ-ă* [Gr. *hudōr,* water; *ouron,* urine]: an excessive secretion of limpid, watery urine. See DIABETES INSIPIDUS.

HYEMAL, a. *hī-ē'măl* [L. *hĭĕmālĭs,* wintry—from *hĭems,* winter; F. *hyémal*]: belonging to or done in winter. HY'EMA'TION, n. *-mā'shŭn,* the passing or spending of winter in a particular place.

HYEN, n. *hī'ĕn: OE.* for HYENA, which see.

HYENA, or HYÆNA, n. *hī-ē'nă* [L. *hyæna,* a hyena: Gr. *huaina,* a hyena—from Gr. *hŭs, a sow*]: genus of digitigrade, carnivorous quadrupeds, included in the genus *Canis* by Linnæus, and by some naturalists referred to the family *Canidæ,* but now more generally to *Viverridæ,* while the dentition connects it even with *Felidæ.* Hyenas have six incisors and two canine teeth in each jaw, five molars on each side in the upper jaw, and four in the under. They seize an object with so firm a hold, that, among the Arabs, they are proverbial for obstinacy. The vertebræ of the neck sometimes become anchylosed in old hyenas. The hind-quarters are lower and weaker than the fore-quarters of the body, so that hyenas move with a shambling gait. The body is covered with rather long, coarse hair, forming a mane along the neck and back. The feet have each four toes. The claws are strong, fit for digging, and not retractile. The tail is rather short. Beneath the anus is a deep glandular pouch, contributing much to the offensive odor by which hyenas are characterized. Hyenas eat carrion as well as newly-killed prey, and are of much use, like vultures, as scavengers, clearing away the last remnants of carcasses that if left to rot would pollute the air. They sometimes attack cattle, especially if they flee, but rarely man,

though they sometimes seize children. During the day they hide themselves in caves, old rock tombs, ruined edifices, etc.; by night, they roam singly or in packs in quest of prey. They prowl about towns and villages, and often dig up corpses that have not been very deeply buried. This, together with their aspect and manners, has caused them to be generally regarded with horror, and very exaggerated accounts of their fierceness have been prevalent. Instead of being untamable, as was long the popular belief, they are capable of being completely tamed, and show an attachment to man similar to that of the dog; they have even been used as watch-dogs. Hyenas are found only in Africa and s. Asia, not extending to the furthest east of the latter continent. The STRIPED HYENA (*H. vulgaris or striata*) is found both in Asia and in Africa, and there are several varieties considerably different in size, color, etc. The smallest hyenas are of the size of a large dog. The SPOTTED HYENA (*H. crocuta*) inhabits s. Africa. It is rather smaller than the largest varieties of the Striped Hyena, but more fierce and dangerous. It is called TIGER-WOLF by the colonists of the Cape of Good Hope. Besides its ordinary howling, which it emits very freely in its nocturnal roamings, this hyena often indulges in an expression of gratification or of some passion, resembling hysterical laughter, whence it has acquired the name LAUGHING HYENA. The general color is ochry gray, with thinly scattered small round brown spots, and sooty muzzle and feet.—The WOOLY HYENA (*H. villosa*) is a smaller s. African species.

HYERES, or HIERES, *ē-ār′:* small town of France, dept. of Var, 3 m. from the Mediterranean, 8 m. e. of Toulon. Pop. 8,046. It is celebrated for the beauty of situation and mildness of climate, and is much resorted to by foreigners suffering from chest or nervous complaints. Near the coast lie the Iles d'Hières, called by the ancients the Stœchades, which, with the exception of the military garrisons of a few forts, are uninhabited.

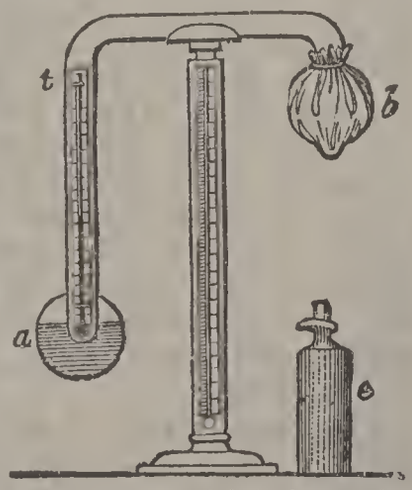
HYETAL, a. *hī′ĕt-al* [Gr. *huetos*, rain]: in *meteor.*, of or belonging to rain; relating to the rainfall of different countries. HYET′OGRAPH, n. *-o-grăf* [Gr. *graphō*, I write]: chart indicating the comparative distribution of rain over a given geographical surface. HYETOGRAPHY, n. *hī′ĕ-tŏg′ră-fĭ*, the science of rain; the study of the quantities and localities in which rain has fallen in a given time. HY′ETOGRAPHIC, a. *-tō-grăf′ĭk*, of or pertaining to the science of rain.

HYGEIA, n. *hī-jē′ă* [L. or Gr.]: in *anc. myth.*, the goddess of Health—daughter of Æsculapius. She was worshipped at Athens, Corinth, Argos, and other important cities, and in works of art is usually represented as a blooming virgin, with a snake, the symbol of health, which drinks from a cup held in her hand. HYGEIA is the

name of one of the planetoids (q.v.), discovered 1849. HYGEI'AN, a. *-jē'ăn*, relating to Hygeia; pertaining to health. HYGIENE, n. *hī'jēn*, or *hī'jĭ-ēn*, health, the science or art of its preservation (see HEALTH: SANITARY SCIENCE). HYGIENIC, a. *hī'jĭ-ĕn'ĭk*, of or relating to health or hygiene. HYGIEIST, n. *hī'jē-ĭst*, one who practices hygiene.

HYGROLOGY, n. *hī-grŏl'ŏ-jĭ* [Gr. *hugros*, wet, moist; *logos*, discourse]: doctrine of the phenomena and causes of the moisture of the atmosphere. HYGROM'ETER, n. *-grŏm'-ĕ-tĕr* [Gr. *metron*, a measure]: instrument for measuring the degree of moisture in the atmosphere. HYGROM'ETRY, n. *-ĕ-trĭ*, the art of measuring the moisture of the atmosphere; the science that treats of the measurement of moisture in bodies, particularly of the atmosphere. HY'GROMET'RIC, a. *-grō-mĕt'rĭk*, or HY'GROMET'RICAL, a. *-rĭ-kăl*, of or relating to hygrometry.

HYGROMETER, *hī-grŏm'ĕ-tĕr:* instrument for measuring the quantity of moisture in the atmosphere. The earlier forms of H. depended on the property possessed by some substances of readily absorbing moisture from the air, and being thereby changed in dimensions or in weight. Of this kind was the hair H. of Saussure, in which a hair, which expands and contracts in length according as the air is more or less moist, was made to move an index; a similar instrument was the whalebone H. of Deluc; but as other causes as well as moisture affect such instruments, they afford no accurate indications. The most perfect H., theoretically, is that of J. F. Daniell (q.v.). It consists of two bulbs connected by a bent tube, as represented in the figure, and inclosing a thermometer, together with some ether and vapor of ether, the air having been expelled. The bulb, *b*, is covered with muslin, and *a* is either blackened or coated with metal. The observer's hand is placed for a short time on *b*, to drive the ether into *a*, leaving *b* and the tube filled with vapor of ether. A little ether is then dropped from a flask, of the form *e*, on the muslin-covered bulb; evaporation instantly takes place, and produces a cooling of *b*, which condenses the vapor inside; a fresh evaporation from *a* fills the vacuum, which is again condensed by dropping ether on *b*, and the process is repeated till the temperature of *a* is so reduced by successive evaporations (see EVAPORATION), that *dew* begins to be formed on the outside of the bulb. At the instant when this occurs, the height of the mercury in the two thermometers is accurately noted, the one giving the dew-point temperature, and the other the temperature of the air. The actual quantity of moisture contained in a cubic ft. of air can now be readily found from the following empirical



formula: weight of moisture in grains $= \frac{5656 \cdot 2}{448+t} \times p$; where t is the temperature of the air at the time of observation, and p (found from tables) the elasticity of vapor at the temperature of the dew-point. The evident defects of this instrument are, first, its rapidity of operation, so that no time is allowed for the glass, ether, and thermometer to come to the same temperature, and, in consequence, the dew-point is given higher than it actually is; secondly, its costliness, owing to the great consumption of ether; and, thirdly, its uselessness in tropical countries, owing to the difficulty of preserving the ether in a fluid state. Daniell's H. was used at the Royal Observatory, Greenwich, from 1840—the commencement of meteorological observations—till 1847, when it was superseded by the more convenient instrument, the Wet and Dry Bulb Thermometers. This instrument consists of two ordinary thermometers—one has its bulb bare, and then shows the temperature of the air; the other has its bulb covered with muslin which is kept wet by a cotton wick dipping into water. The evaporatton from the muslin, and consequent cooling of the bulb, being in proportion to the dryness of the air, the difference between the readings of the two thermometers is greatest when the air is driest, and zero when it is completely saturated. The readings of the thermometers being taken, the elastic force of vapor at the dew-point is calculated by the formula of Dr. Apjohn (*Proceedings of the Royal Irish Acad.* 1840):

$$(1)\ F = f - \frac{d}{88} \cdot \frac{h}{30};\quad (2)\ F = f - \frac{d}{96} \cdot \frac{h}{30};$$

the first formula to be used when the wet thermometer it above, and the second when it is below, the freezing-point (32°). In these formulæ, F is the elastic force of vapor at the dew-point, which has been determined for differen-temperatures by Regnault from carefully conducted experiments; f, the elastic force at the temperature of evaps oration (or reading of wet bulb); d, the difference between the dry and wet bulbs; and h, the height of the barometer. From this the quantity of moisture in a cubic ft. of air, etc., can be found as above. To dispense with these troublesome calculations, Glaisher's *Hygrometric Tables* may be used.

HYGROSCOPE, n. *hī'grō-skōp* [Gr. *hugros*, wet, moist; *skŏpĕō*, I see or view]: an instrument to show the moisture or dryness of the air. Hy'groscop'ic, a. *-skŏp'ĭc*, pertaining to the hygroscope; applied to moisture not readily apparent, but capable of detection by the hygroscope; having affinity to water.

HYGROSTATICS, n. plu. *hī'grō-stăt'ĭks* [Gr. *hugros*, moist; *stătĭkŏs*, standing or settling]: the science of comparing relative degrees of moisture.

HYKSOS, *hĭk'sos*, or Hyksnos, *hĭk'shos* [Egyptian, *hyk*, ruler (or, as some say, captive), and *shos*, shepherd]: Egyptian dynasty, generally known as the Shepherd Kings. According to Josephus and Africanus. they consisted of

six or eight kings, named (1), Salatis, Silitis, or Saites, who reigned 19 or 15 years; (2), Beon, Banon, or Buon, who reigned 43 or 44 years; (3), Apachnas, Apachnan, or Pachnas, who reigned 36 or 61 years; (4), Apophis, Aphosis, who reigned 61 years; (5), Anas, or Anan, who reigned 50 years; (6), Archles, who reigned 49 years; (7), Assis, or Asseth, who reigned 49 years and 2 months; (8), Apobis, who reigned 61 years. The greatest discrepancy exists in the names and their arrangement, and as to the total number of years of the dynasty. Manetho, according to Josephus, states that they reigned 511 years, but the total of the reigns he cites amounts to only 259 years 10 months; while Africanus makes their duration 284 years, and Eusebius 103. Africanus makes the Shepherds consist of the 15th, 16th, and 17th dynasties, and to have ruled 953 years, but gives the names and reigns of only one, which he calls the 15th; while Eusebius makes them more correctly the 17th dynasty. They are stated in the Egyptian annals to have been a race of conquerors from the East, who, under Salatis, their first king, took Memphis, and rendered tributary the whole of Egypt, and fortified the city of Avaris, on the e. of the Bubastite arm of the Nile, where he maintained a garrison of 240,000 soldiers. Their oppression, however, drove the Egyptians to revolt, and under Taakan, predecessor of Aahmes or Amasis I. of the 18th dynasty, a religious quarrel about the temples of Ra or the sun, and of Set, the god of the H., seems to have commenced, when a long war broke out, which ended under Aahmes, with the siege of Avaris; and a king called Misphragmuthosis, supposed to be a Thothmes, finally drove them out. The monument of an officer, named Aahmes-Penneben, at El Kab, recounts this siege and his exploits. Finally, according to Manetho, they departed under treaty. The great interest attaching to the H. is that, by the old ecclesiastical writers, they were confounded with the Hebrews, or supposed to be the monarchs under whom Joseph entered Egypt. In the monuments and the papyrus of Turin, in which portions of their names occur in the list of the kings, they bear the full titles of monarchs, though the papyri state that there were no kings in Egypt at the time, and that Taakan himself was only a *hek*, or prince of the south. The H., on a contemporary inscription remaining at El Kab, are called *Mena*, or Shepherds. The H. were not the devastating conquerors described by the historian. They entered Egypt, it appears from the monuments, about the 14th Egyptian dynasty, and were content with inscribing their names and titles on the monuments of their predecessors, the name of Appapus having been found on a colossus of Sebakhetp III. of the 13th dynasty, and on that of a king of the 14th dynasty at San. Traces of that of Saites or Salatis have been found also at Tel-Mokdam or Cynopolis. The greatest divergence of opinion as to their race and origin has prevailed among authors. Josephus calls them Hebrews or Arabs; the Syncellus, Phœnician shepherds. They have been supposed also to be Idu-

mæans, Ishmaelites, or Scythians. Their physiognomy indicates a Semitic origin, while their worship of Set connects them with the Khita, a people n. of Palestine, on the confines of Mesopotamia. The names of the kings show no foreign peculiarities; some are purely Egyptian. As regards the date of the Hyksos dominion, the most conflicting opinions have prevailed among scholars. Bunsen makes their rule end B.C. 1639; Lepsius, B.C. 1842. Placing, however, the discovered date of Thothmes III., B.C. 1445, in his 16th year, the Hyksos dominion must have ended about B.C. 1500.

Bunsen, *Egypt's Place;* Lepsius, *Königsbuch;* Boïkh, Manetho; De Verria in *Rev. Arch.*, IV.; Mariette in *Rev. Arch.*, III.; Brugsch, *Histoire d'Egypte;* Rawlinson, *History of Ancient Egypt.*

HYLÆOSAURUS, n. *hī'lē-ō-saw-rŭs* [Gr. *hūlē,* wood, matter; *sauros,* a lizard]: in *geol.*, huge dinosaurian reptile, found in the Wealden strata of Kent and Sussex, England. Fragments of different individuals have been found sufficient to give an approximate notion of the affinities and great size of this reptile. The bones of the head have not yet been observed; its teeth were comparatively small, and close set; they indicate that it was a vegetable-eater. The body was broader than high, and terminated in a long, slender, flexible tail; the limbs were relatively short; the skin was covered with scutes and tubercles; and a row of very large, thin, angular, bony spines extended down the back, and formed a serrated dermal crest, like the horny spines of the modern iguana. It is supposed to have attained a length of 25 ft. The remains of only one species have been found; it has been named *H. Oweni.*

HYLISM, n. *hī'lĭzm* [Gr. *hūlē,* matter]: in *meta.*, the theory which regards matter as the original principle of evil, in opposition to the *good spirit.*

HYLONOMUS, n. *hī-lŏn'ō-mŭs* [Gr. *hūlē,* wood, matter; *nŏmŏs,* an abode]: in *geol.*, a small lacertian reptile found inclosed in fossil tree-trunks.

HYLOZOISM, n. *hī-lō-zō'ĭzm* [Gr. *hūlē,* matter; *zōē,* life]: the doctrine that matter has a necessary existence, is essentially endowed with life, and that life is only a property of matter. The early Greek materialists, Thales and Anaximenes, show hylozoistic tendencies. Strato of Lampsacus taught that each atom lives independently of all the other atoms, and the world is a mass of living beings. The Stoics taught that the world is a living being, and that the material elements live only through participation in the common life. Hylozoism appears in the school of Alexandria, in the Renaissance philosophy of nature, in Spinoza, in Haeckel, and in some recent physical scientists. HYLOZO'IC, a. or HYLOZO'ICAL, a. *-ĭk-ăl,* pertaining to Hylozoism; materialistic. HYLOZO'IST, n. *-zō'ĭst,* a believer in Hylozoism. HYLOTHE'ISM, n. *-thē'-*

ĭzm [Gr. *Thēōs*, God], the doctrine that the material world alone is God; material pantheism. HYLOTHE'IST, n. *-ĭst*, a believer in hylotheism.

HYMEN, n. *hī'mĕn*, also HYMENÆUS [L. *Hymen;* F. *Hymen*—from Gr. *Hūmēn*]: originally the bridal song among the ancient Greeks, sung by the companions of the bride as she went from her father's house to that of the bridegroom: thence in *anc. myth.*, the god of marriage. The god Hymen is mentioned first by Sappho. The legends concerning him are various; but he is usually said to be a son of Apollo and some one of the Muses, though often his parentage is referred to Bacchus and Venus. He is represented as a boy with wings and a garland, a bigger and graver Cupid, with a bridal-torch and a veil in his hands. *Hymen* is also the name given to the virginal membrane. HY'MENE'AL, a. *-mĕn-ē'ăl*, pertaining to marriage: N. a marriage song; also HY'MENE'AN, n. *-mĕn-ē'ăn*.

HYMENIUM, n. *hī-mē'nĭ-ŭm* [Gr. *hūmēn*, a membrane]: in *bot.*, that portion of the fructification of a fungus in which the sporules are situated, usually more or less a membranous expansion; the part which bears the fructification in agarics. HYMENIAL, a. *hī-mē'nĭ-ăl*, belonging to the hymenium. HYMENICOLAR, a. *hī'mē-nĭ-kō'lĕr* [L. *colo*, I inhabit]: in *bot.*, inhabiting the hymenium.

HYMENOCARIS, n. *hī'mĕn-ŏk'ă-rĭs* [Gr. *hūmēn*, a membrane; *karis*, a shrimp]: in *geol.*, a small shrimp-like crustacean.

HYMENOGENY, n. *hī'mĕn-ŏj'ĕ-nĭ* [prefix *hymeno-;* Gr. *gennaō*, I produce]: in *physiol.*, production of membranes by the simple contact of two liquids, as albumen and fat, when the former gives a coating to the globules of the latter.

HYMENOPTERA, n. plu. *hī'mĕn-ŏp'tĕr-a*, also HY'MENOP'TERS, n. plu. *-tĕrz* [Gr. *hūmēn*, a membrane; *ptĕrŏn*, a wing]: an order of insects having four membranous wings, as bees or wasps. HY'MENOP'TEROUS, a. *-tĕr-ŭs*, pertaining to. *Hymenoptera* comprise a very great number of species, estimated at about one-fourth of the whole class, and of which some, as ants and bees, are singularly interesting and important. They have the mouth furnished with mandibles for cutting and tearing, but the other parts of the mouth are adapted for suction, and are generally narrow and elongated, often united into a kind of proboscis, as in bees (see BEE). The antennæ are generally slender, but often exhibit differences in the sexes of the same species. The wings are four, the first pair larger than the second, the wings of the same side united in flight by little hooks. The wings, when at rest, are laid one over another horizontally over the body. The wings are entirely membranous, not reticulated, as in the *Neuroptera*, but with

comparatively few nervures, the arrangement of which is so constant in the whole order that particular names have been given to them and to the spaces between them, and their diversities have been made use of in classification. The wings are wanting in the imperfectly developed females (*neuters*) of some. Besides the ordinary eyes, all the Hymenoptera have three small simple (or *stemmatic*) eyes on the top of the head. The abdomen is generally united to the thorax by a slender pedicle. The abdomen of the females is generally furnished with an organ capable of being protruded, but for different purposes in different sections of the order, it being in some of the hymenopterous tribes an ovipositor or borer, and in others a sting. The Hymenoptera in their perfect state generally feed on honey, but some of them prey on other insects, which are the food of the larvæ of a greater number; while the larvæ of some feed on various vegetable substances. The metamorphoses of the insects of this order are perfect; the larvæ are generally —though not in all the families—destitute of feet; the pupæ take no food. The Hymenoptera are remarkable for the dilatation of the *tracheæ* or air-tubes into vesicles, and the general perfection of the respiratory system. The instincts, and even apparent intelligence, displayed by some—particularly the *social* kinds, which live in communities—have excited admiration from the earliest times. The order is divided into two sections—*Terebrantia*, having an ovipositor; and *Aculeata*, having a poison reservoir and sting. To the former belong saw-flies, gall-flies, ichneumons, etc.; to the latter belong ants, bees, wasps, etc.

HYMETTUS, *hī′mĕt-ŭs:* mountain in Attica, now called Trelo Vouni, s.e. of Athens; famous among the ancients for its honey and its marble. The honey still retains its reputation.

HYMN, n. *hĭm* [L. *hymnus;* Gr. *humnŏs*, a song in honor of the gods: F. *hymne*]: song or ode of praise or of prayer addressed to the divine honor, or relative to religious emotions or experience. The word in its strict acceptation supposes a certain metrical structure, or at least some kind of rhythmical cadence. The modern distinction between psalms and hymns is arbitrary (see PSALMODY; PSALMS). 'Bede speaks of the whole book of Psalms as called *Liber Hymnorum*, by the universal consent of Hebrews, Greeks, and Latins.' The use of hymns dates from the earliest days of Christianity (Matt. xxvi. 30; Col. iii. 16; Acts xvi. 25; Jas. v. 13; I Cor. xiv. 15, 26). There are passages in the New Testament whose poetical and hymn-like structure in the Greek, with rhythm (and in one case rhyme), gives rise to the belief among oriental scholars that they are extracts from original hymns in use during the apostolic age. Of such passages—beside the Hymn of the Virgin Mary (*Magnificat*, Lk. i. 46-55), of Zacharias (*Benedic-*

tus, Lk. i. 68-79), of Simeon (*Nunc dimittis,* Lk. ii. 29-32), and the Hymn of the Angels (*Gloria in Excelsis,* Lk. ii. 14)—are Eph. v. 14; I Tim. iii. 16; vi. 15, 16; II Tim. ii. 11, 12; and the thanksgiving prayer of the assembly of disciples, Acts iv. 25-30. Also, there are exultant songs of praise in the Revelation; see Rev. iv., v., vii., xi., xv., xix. Our information as to the hymns of the early ages, and still more as to their authors, is extremely imperfect. *Te Deum* is variously ascribed to St. Ambrose, St. Hilary, Abundius, and a monk named Sissabul. To Prudentius, with greater certainty are assigned *Hymn of Holy Innocents, Salvete Flores Martyrum,* and *Ales Diei Nuntius.* (See MAGNIFICAT: GLORIA: TE DEUM). Even the names of many of the authors of the more modern hymns are involved in uncertainty; but some of the most esteemed hymns are known as the production of Sedulius, of Fortunatus, of Paul the Deacon, of St. Bernard, and of St. Thomas. The number of hymn-writers in the modern languages is so great as to preclude enumeration here. The most complete modern collection of mediæval Latin hymns is Mone's *Hymni Latini Medii Ævi* (1856). V. to praise or worship in song. HYMNING, imp. *hĭm'ĭng:* N. the singing of hymns. HYMNED, pp. *hĭmd.* HYMNIC, a. *-nĭk,* relating to hymns. HYM'NAL, n. *-năl,* a collection of hymns for public worship. HYM'NIST, n. *-nĭst,* a composer of hymns. (This is a much more correct form than hymnologist, though that word, which really means 'one who writes or discourses about hymns,' is in more general use.) HYMNOL'OGY, n. *-nŏl'ŏ-jĭ* [Gr. *logos,* discourse]: a discourse on hymns; the system or arrangement of hymns.

HYOID, a. *hī'oyd* [Gr. *υ,* the Greek letter upsilon; *eidos,* likeness]: having the form of an arch or of the Greek letter *υ*: N. a bone between the root of the tongue and the larynx. HYOI'DES, n. plu. *-dēz.* HYOI'DEAL, a. *-dĕ-ăl,* connected with the hyoid bone. HYOGLOSSUS, n. *hī'ō-glŏs'sŭs* [Gr. *glōssa,* tongue]: a flat quadrate muscle, arising from the whole length of the great cornu of the hyoid bone, and inserted into the tongue.

HYOPOTAMUS, n. *hī'ō-pŏt'ă-mŭs* [Gr. *hus,* a hog; *pŏtămos,* a river]: in *geol.,* a non-ruminant and even-toed tertiary animal.

HYOSCYAMUS, n. *hī'ŏs-sī'ă-mŭs* [L. *hyoscy'amus;* Gr. *hŭŏsku'ămŏs,* henbane—from Gr. *hus,* a hog; *ku'ămŏs,* a bean]: henbane, a genus of poisonous plants, used in medicine, of the ord. *Solănācĕæ.* HY'OSCY'AMINE, n. *-mĭn,* a peculiar poisonous substance obtained from henbane; also HY'OSCYA'MIA, n. *-ā'mĭ-ă.* See HENBANE.

HYP, *hĭp,* and HYPO, *hī'pŏ* [Gr. *hūpŏ,* under]: a common prefix in scientific terms, signifying *under* or *beneath,* in reference to place or position; indicating *deficiency,* or *less than,* when applied to quality or composition; used in same sense as L. prefix *sub.*

HYPÆTHRAL, a. *hī-pē'thrăl* [Gr. *hupaithros*, in the open air—from *hupo*, under; *aither*, the clear sky]: in *arch.*, exposed to the open air; without a roof. HYPÆ'THRUM, n. *-thrŭm*, in *arch.*, that portion of the interior of a building which is not protected by a roof.

HYPALLAGE, n. *hī-păl'lă-jē* [Gr. *hupal'lăgē*, an exchange—from *hupo*, under; *allassō*, I change]: a figure of speech in which words are made to interchange their cases, tenses, or relations.

HYPAPOPHYSIS, n. *hī'pă-pŏf'ĭ-sĭs* [Gr. *hupo*, below; *apŏph'ŭsis*, a sprout or process]: in *anat.*, a process or protuberance of bone which descends from the lower part of the centrum or body of the vertebra.

HYPATIA, *hī-pā'shĭ-â:* astronomer and mathematitian of Alexandria, and head of the Neo-Platonic school in that city; b. in the latter part of the fourth c. (370 according to Hoche); murdered 415; daughter of Theon of Alexandria, mathematician and philosopher. She was remarkable equally for her beauty, her wisdom, and her tragic fate. From her earliest youth she showed an amazing intelligence, in consequence of which, her father, one of the most erudite men of his time, resolved to give her genius a thoroughly philosophic culture. She succeeded her father in the chair of philosophy at Alexandria; and the fame of her lectures drew round her students from all parts of the East where the influence of Greek thought and knowledge was felt. Hypatia seems to have been worthy of the lofty eulogies that she has received. Amid the widespread corruptions of Alexandria, she lived as spotless as a vestal; and though her teaching was not such that it could lay a strong hand on the frightful vices of heathenism, and arrest their course, it at least indicates in her a love of beauty, truth, and goodness, that was Christian in its spirit, though heathen in its form and limitations. Among her numerous pupils was Synesius, afterwards Bishop of Ptolemais, whose letters to her showed his profound reverence. The citizens of Alexandria were proud of her; and such reliance was placed on her judgment and sagacity, that the magistrates used frequently to consult her on important cases. Among those who were most intimate with her was Orestes, prefect of the city. At this time, the Bishop of Alexandria was Cyril (q.v.), a fierce hater of heathens and heretics. Detesting Orestes, whom he suspected of being no true Christian, and who had drawn up an accusation against him for exciting a tumult, he soon cast an evil eye on Hypatia, whom he regarded as a Satanic enchantress, and the grand obstacle to his reconciliation with the prefect. His hatred communicated itself to the lower clergy, and especially to certain savage monks from the Nitrian deserts, who, headed by one Peter, a reader, attacked Hypatia in the streets as she was returning from her lecture-room. The

maiden was dragged from her chariot, hurried to the Cæsarian Church, where she was stripped naked, and murdered with tiles, after which she was torn to pieces, and her limbs carried to a place called Cinaron, and there burned to ashes. Suidas records that Hypatia was author of mathematical commentaries, and of an astronomical canon: her works have not been preserved. She is the heroine of Charles Kingsley's romance, *Hypatia, or New Foes with an Old Face.*

HYPER, *hī'pėr* [Gr. *hūper,* above]: a prefix signifying *above, over,* or *beyond,* in reference to place or position; indicating *excess* when applied to quality or composition; in *chem.,* applied to acids which contain the largest proportion of oxygen.

HYPERÆMIA, n. *hī'pėr-ē'mĭ-ă* [Gr. *huper,* over; *haima,* blood]: excessive supply or accumulation of blood. HY'PERÆ'MIC, a. *-e'mĭk,* pertaining to; having an excessive supply of blood.

HYPERÆSTHESIA, n. *hī'pėr-ēz-thē'zhĭ-ă* [Gr. *huper,* above; *aisthēsis,* perception, sensation]: in *med.,* term including those affections which have this property in common—viz., exalted irritability and morbid sensibility of the nerves. Hyperæsthesia of the cutaneous nerves is manifested by pain in its various modifications, sometimes intensely severe, as in Tic Douloureux (q.v.), while hyperæsthesia of the nerves of special sense is manifested by phantasms, illusions, etc. The following points are common to the whole class of these affections: (1) Periodicity, or the alternations of paroxysms and intermissions; (2) Uniformity and persistence of the symptoms, however long the duration of the disease; (3) No danger to life; (4) Freedom from this class of disease in early life. Of the disease predisposing to hyperæsthesia, hysteria is far the most frequent; but it is sometimes induced by rheumatism, gout, skin-diseases, etc.

HYPERBATON, n. *hī-pėr'bă-tŏn* [Gr. *huper,* above or beyond; *bainō,* I go]: a figure of grammar in which the natural order or construction of a sentence is inverted. HY'PERBAT'IC, a. *-băt'ĭk,* transposed; inverted.

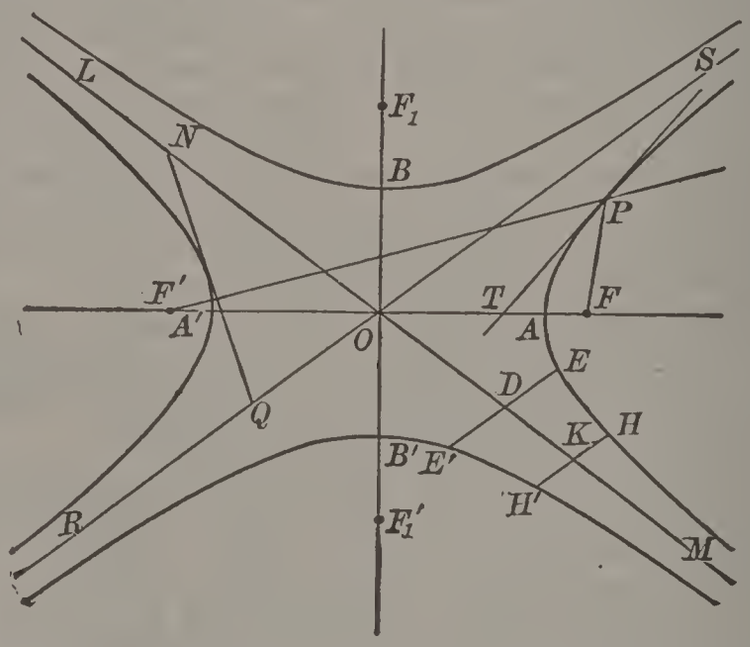
HYPERBOLA, n. *hī-pėr'bō-lă* [Gr. *huper,* over, beyond; *ballō,* I throw]: a section of a conical surface (see CONE) made by a plane which intersects both nappes of the surface; or, it is a conic whose eccentricity is greater than unity. Kinematically it may be defined as the locus (or path) of a point which moves so that the difference of its distances from two fixed points (F′ and F), called foci, is constant. This property of the curve may be expressed by the equation F′P-FP=2a, where 2a is constant and equal to the chord A′A drawn through F′ and F. The point O midway between the foci is called the *centre;* and the line A′A is called the *transverse axis.* Draw OY perpendicular to A′A; with A as centre and OF as radius describe arcs cutting OY in

B′ and B. Then the line B′B is called the *conjugate axis.*

If the axes of the curve are taken as axes of coördinates the equation of the hyperbola cutting OX in A′ and A is $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, where a=OA and b=OB. The equation of the other hyperbola shown in the figure having B′B for *transverse* axis and A′A for *conjugate* axis is $\frac{y^2}{b^2} - \frac{x^2}{a^2} = 1$. These two hyperbolas are said to be *conjugate* to one another. The eccentricity of the former is $e=\sqrt{a^2+b^2}\div a=OF\div OA$; of the latter $e_1=\sqrt{a^2+b^2}\div b=OF_1\div OB$. Hence in both curves $e>1$. The coördinates of the foci of the former are $(\pm ae,o)$, of the latter $(o,\pm be_1)$. Hence the four foci are the same distance from the centre.

If the pole is at O the polar equation of the former hyperbola is $r^2=\frac{-b^2}{1-e^2\cos^2\theta}$. If the pole is at F the polar equation may be written $r=\frac{l}{1-e\cos\theta}$, where $l=\frac{b^2}{a}$. This is the same equation as in the case of the ellipse, only here $e>1$.

The hyperbola is the only conic that has real asymptotes (q.v.). Two conjugate hyperbolas have the same



asymptotes. For the two curves in the figure they are the lines LM and RS. The asymptotes have the following remarkable properties: Take any two point D and K on OM such that OK=r.OD where r is constant. Through D and K draw lines parallel to the other asymptote meeting the curves in E,H and E′,H′. Then area DEHK=area DE′H′K=$\frac{1}{2}$ablogr, which shows that these areas are the same wherever the point D may be taken. Also the area of the triangle ONQ formed by any tan-

gent line and the asymptotes is constant, and the line NQ is bisected by the point of tangency.

The two lines F′P and FP make equal angles with the line PT tangent to the curve at P. Hence if rays of light emanate from one focus of a hyperbolic mirror, the reflected rays will diverge precisely as if they all came directly from the other focus.

If a heavenly body, such as a comet, say, is found to be moving in a hyperbolic orbit as it approaches the sun, it will recede after passing around the sun and never return.

HYPERBOLE, n. *hī-pėr′bō-lē* [L. *hyper′bŏle;* Gr. *huper′bŏlē*—from *huper,* over, beyond; *ballō,* I throw]: figure of rhetoric, by which expressions are employed that, taken literally, signify more than is really meant: The use of the figure is to arrest the attention, and it abounds in oriental writing. Hyperbole is the basis of many metaphors. Thus, Nero is called a 'monster'; Tamerlane, a 'tiger'; and so on. HY′PERBOL′IC, a. *-bŏl′ĭk,* also HY′PERBOL′ICAL, a. *-ĭ-kăl,* relating to or connected with the hyperbole; exaggerating much beyond the truth. HY′PERBOL′ICALLY, ad. *-kăl-lĭ.* HYPER′BOLISM, n. *-bō-lĭzm,* the use of hyperbole. HYPER′BOLIST, n. *-lĭst,* one who. HYPER′BOLIZE, v. *-bō-līz,* to speak or write with exaggeration; to exaggerate. HYPER′BOLI′ZING, imp. HYPER′BOLIZED, pp. *-līzd.*

HYPERBOREAN, a. *hī-pėr-bō′rē-ăn* [Gr. *huper,* over or beyond; *borĕăs,* the north]: of or from the north; northern: N. an inhabitant of the extreme north. HYPERBOREANS, n. plu. (dwellers beyond Boreas or the North Wind): name given by the ancients to all the unknown peoples of the west and north. The Greeks imagined the country n. of the Rhipæan (generally supposed to be the Ural) mountains to be inhabited by the Hyperboreans, and their residence was gradually referred to more distant regions; but it was universally supposed that, as the favorites of Apollo, they enjoyed a terrestrial paradise, a bright sky, and a perpetual spring, a fruitful land, and everlasting youth and health.

HYPERCRITIC, n. *hī′pėr-krĭt′ĭk* [Gr. *huper,* beyond; *krĭtĭkos,* critical; F. *hypercritique*]: one who is critical beyond measure or reason. HY′PERCRIT′IC, or HY′PERCRIT′ICAL, a. *ĭ-kăl,* unfairly severe or critical. HY′PERCRIT′ICALLY, ad. *lĭ.* HY′PERCRIT′ICISM, n. *-ĭ-sĭzm,* excessive or ungenerous criticism.

HYPERDULIA, n. *hī′pėr-dū′lĭ-ă* [Gr. *huper,* over; *doulei′a,* slavery, servitude]: in the *R. Cath. Chh.,* a superior kind of devotion paid to the Virgin Mary as distinguished from the 'dulia' or worship offered to saints and angels.

HYPERDYNAMIC, a. *hī-pėr-dī-năm′ĭk* [prefix *hyper;* Eng. *dynamic*]: in *pathol.,* for the time being morbidly over-excitable, with the attendant symptom of undue

strength, sure to be followed by proportionate exhaustion and feebleness.

HYPERICACEÆ, *hī-pĕr-ĭ-kā'sē-ē*, or HYPERICI'NÆ, *hī-pĕr-ĭ-sī'nē:* natural order of exogenous plants, containing about 300 known species, trees, shrubs, and herbaceous plants, widely distributed over the world, and in very different climates, but abundant particularly in N. America. The leaves are generally covered with pellucid dots, and the edges of the leaves, sepals, and petals bordered with black glands. The stamens are united at the base, and grouped in from 3 to 5 bundles. The species of *Vismia* yield a substance resembling gamboge. Many of the Hypericaceæ belong to the genus *Hypericum*, or St. John's Wort, of which some species are common natives of Britain, adorning woods, heaths, etc., with their bright yellow flowers. *H. calycinum*, a spreading shrubby species, has flowers more than two inches in diameter. *H. perforatum*, the common or true St. John's Wort, has astringent properties, and is used for gargles and lotions, and internally in dysentery, etc., though not recognized in the pharmacopœia. Superstitious notions are connected with it in many parts of Europe, particularly when gathered on the day of St. John the Baptist. *H. Androsœmum* (or *Androsœmum officinale*), commonly called Tutsan, with berry-like fruit, was once in great esteem as a vulnerary. Its English name, *Tutsan*, is from the French *tout saint*, all whole.

HYPERICUM, n. *hī-pĕr'-ĭ-kŭm* [prefix *hyp-;* Gr. *ereikē*, heath, heather]: in *bot.*, St. John's Wort; typical genus of *Hypericaceæ* (q.v.).

HYPERIDES, *hĭp-ĕ-rī'dēz* or *hī-pĕr'ĭ-dēz:* Athenian orator, one of the ten Attic orators; b. prob. abt. B.C. 390; put to death by Antipater shortly after B.C. 322. Till B.C. 324, Hyperides supported Demosthenes; then opposed him. He had a subtle, graceful wit, and a rich vocabulary, and was a devotee of pleasure.

HYPERINOSIS, n. *hī'pĕr-ĭ-nō'sĭs* [Gr. *huper*, beyond; *is*, a fibre, *inos*, of a fibre]: in *med.*, a condition characterized by an excessive formation of fibrine in the blood.

HYPERION, n. *hī-pē'rĭ-ŏn* [L. *Hypĕrion;* Gr. *Hupĕrīōn*]: in *L.* and *Gr. myth.*, one of the Titans (q.v.), son of Uranus and Ge; Apollo, the god of day; a model of manly beauty.

HYPERMETER, n. *hī-pĕr'mĕ-tĕr* [Gr. *huper*, beyond; *mĕtron*, measure]: anything greater than the ordinary standard of measure; a line or verse of poetry containing a syllable more than the usual number. HY'PERMET'RICAL, a. *-rĭ-kăl*, having a syllable too much.

HYPERODAPEDON, n. *hī'pĕr-ō-dăp'ĕ-dŏn* [Gr. *huper*, above, excess; *odous*, a tooth; *dapĕdon*, pavement]: a lacertilian reptile found in rocks of supposed triassic age, so named from the many pavement-like palatal teeth.

HYPEROSTOSIS, n. *hī'pėr-ŏs-tō'sĭs* [Gr. *huper*, over; *osteon*, a bone]: an unnatural growth or projection from a bone; same as 'exostosis.'

HYPERPLASIA, n. *hī'pėr-plā'zhĭ-ă* [Gr. *huper*, over; *plassō*, I form]: excessive multiplication of the elements of a part. HY'PERPLAS'TIC, a. *-plăs'tĭk*, of or pertaining to hyperplasia. See HETEROLOGOUS.

HYPERPYREXIA, n. *hī'pėr-pĭr-ĕks'ĭ-ă* [Gr. *huper*, over; Eng. *pyrexia*]: the temperature of any body when very high, or when over 106° Fahr.

HYPERSARCOSIS, n. *hī'pėr-săr-kō'sĭs* [Gr. *huper*, beyond; *sarx*, or *sarka*, flesh]: the proud or fungous flesh of a wound; also Hypersarcoma.

HYPERSTHENE, n. *hī'pėrs-thēn* [Gr. *huper*, above or excess; *sthĕnŏs*, strength]: mineral closely related to augite and diallage. It is a bisilicate of iron and magnesia; crystalline, but often found granular or disseminated. Viewed in one direction, with reference to its cleavage planes, it is copper-colored; in another it is dark brown. When cut and polished, it is cherry red, with a pearly lustre, and is valued for rings, brooches, etc. The finest specimens are brought from the coast of Labrador (hypersthene was formerly confounded with hornblende, and called Labrador hornblende), though it is found in Norway, Sweden, Germany, Scotland, etc. It is found sometimes in connection with felspar, forming *Hypersthene rock*, a rare kind of trap rock.

HYPERSTHENIA, n. *hī'pėrs-thēn'ĭ-ă* [Gr. *huper*, excess; *sthĕnŏs*, strength]: excessive energy of the organic powers amounting to disease. HY'PERSTHEN'IC, a. *thĕn'ĭk*, of or belonging to.

HYPERTHYRION, n. *hī'pėr-thīr'ĭon* [Gr. from *huper*, above, beyond; *thura*, a door]: in *arch.*, that part of the architrave which is over a door or window.

HYPERTROPHY, n. *hī-pėr'trō-fĭ* [Gr. *huper*, beyond; *trŏphē*, food, nourishment]: excessive growth of a part; an increase in size of the healthy structure of an organ. The best examples of this change are seen in the muscular system, where it may occur altogether independently of disease. The huge bosses of flesh that stand out prominently in the arm of a blacksmith or of a pugilist, and in the leg of a ballet-dancer, are illustrations of hypertrophy, where the general health may be perfect. In double organs, such as the kidneys, if the organ on one side degenerates through disease, the organ on the opposite side is often found to enlarge, and carry on double work. When the valves of the heart are narrowed so that the flow of blood through them is hindered, or defected so that there is regurgitation, the walls of the organ become thickened so that the increased force of the contraction may overcome the obstacle. In these cases, hypertrophy is an effect of disease,

but is at the same time conservative, being an effort of nature to preserve life. There are, however, cases in which the hypertrophy has a hurtful instead of a conservative effect, e.g., hypertrophy of the thyroid gland, constituting the disease known as goitre or bronchocele; hypertrophy of the prostate gland, of the spleen, etc. The following are, according to Paget, the conditions which give rise to hypertrophy: (1) The increased exercise of a part in its healthy function; (2) An increased accumulation, in the blood, of the particular materials which a part appropriates in its nutrition or in secretion; (3) An increased afflux of healthy blood. In hypertrophy of the muscular tissue, the first and third of these conditions are present. In hypertrophy of the fatty tissue, constituting obesity, there is an excess of fat or of its chief elements in the blood. HYPER'TROPHIED, a. *-fĭd,* caused or effected by hypertrophy; excessively developed.

HYPERYTE, n. *hī'pĕr-īt:* a dark-colored, granite-like rock, composed of serpentine and hypersthene.

HYPHA, n. *hī'fă,* HYPHÆ, n. plu. *hī'fē* [Gr. *hūphē,* weaving]: the long cellular filaments occurring in many cryptogams, which, matted together, form a mycelium. HYPHAL, a. *hī'făl,* pertaining to a filamentous tissue.

HYPHEN, n. *hī'fĕn* [L. *hyphen*—from Gr. *hūphĕn,* under one, together—from *hupo,* under; *hen,* one]: a short line between syllables, or between the parts of a compound word. HY'PHENED, a. *-fĕnd,* united by a hyphen.

HYPINOSIS, n. *hī-pĭn-ō'sĭs* [prefix, *hyp-;* Gr. *is, inos,* strength, muscle, fibre]: in *pathol.,* a diminished amount of fibrin in the blood, an occasional attendant on anæmia.

HYPNÆI, n. *hĭp'nē-ī:* a large order, tribe, or family of pleurocarpous or lateral-fruited mosses, with nodding capsule on a long footstalk, the stems generally cylindrical, the leaves imbricated.

HYPNOSCOPE, *hĭp'no-skōp:* powerful magnet, devised for measurement of hypnotic sensitiveness. It is said that 30 per cent. of persons tested manifest effects in about two minutes. The correctness of the results obtained awaits verification.

HYPNOTIC, a. *hĭp-nŏt'ĭk* [Gr. *hypnos, sleep:* tending to produce sleep: N. a medicine which produces sleep; a soporific. HYPNOLOGY, n. *hĭp-nŏl'o-jĭ* [Gr. *logos,* a discourse]: treatise or discourse on sleep and its phenomena; the study of the phenomena of sleep. HYPNOLOGIST, n. *-jĭst,* one versed in hypnology. HYPNOSIS, the condition of being in hypnotic sleep (see HYPNOTISM). HYPNOTIST, n. one who believes in or practices hypnotism. HYP'NOTIZE, to bring into the peculiar sleep produced by hypnotism (q.v.).

HYPNOTISM, *hĭp'nō-tĭsm:* kind of sleep produced by suggestion (q.v.) of various kinds. Hypnotism, often known as mesmerism, or animal magnetism, designates certain phenomena which arise from the physical and psychical condition of the patient, and not from any emanation proceeding from others. From time immemorial, Egyptian conjurers and sorcerers have been accustomed to produce artificial somnambulism, usually by inducing their subjects to gaze intently for a few minutes at certain cabalistic signs marked on the centre of a white plate. The Yogins, a Hindu sect, practice similar arts; the peculiar states of trance or ecstacy into which the Mount Athos monks and other religious fanatics were accustomed to throw themselves, are of kindred nature; and many allusions in the works of classical authors relate to phenomena more or less of this kind.

About the middle of the 17th c., while the phenomena of terrestrial magnetism were attracting considerable attention, one Valentine Greatrakes, in London, professed to cure diseases by stroking with the hand. A century later, Gassner, Swabian priest, employed a similar mode of treating disease, which he ascribed to demoniacal possession. About 1774, Mesmer, a Viennese physician, began to treat diseased organs by application of artificial magnets. The phenomena exhibited by his patients, especially the more nervous of them, led him to adopt the view that the magnets operated not as special sources of influence, but as conductors of a magnetic fluid which he could communicate at will to the patient, even at a distance. Four years later, he commenced practice in Paris with great success. His usual methods were to seat his patient with his back to the north, to press the pit of the stomach and make passes with his hands in front of his face, meanwhile fixing his patient's eye, and soothing him by the aid of music. Sometimes, too, he placed his patients in connection with 'magnetized' trees, or set them in a circle around a covered vessel from which he professed to conduct the invisible fluid, thus inducing peculiar nervous conditions. In 1785 a royal commission was appointed to examine Mesmer's pretensions. These investigators found that the same phenomena could be produced in Mesmer's more nervous patients when blindfolded, by merely inducing them to suppose themselves in the neighborhood of any of Mesmer's magnetic appliances, though none were really present; while conversely, magnets and magnetic tree were alike powerless, if the patient were kept unaware of their proximity. The Marquis de Puységur at the same time discovered that he could induce artificial somnambulism without the aid of magnets, by passes alone; but, unfortunately for further investigation, the subject fell into the hands of the archquack, Cagliostro (q.v.), and thus became extremely discredited by physiologists. Despite the unfavorable report of the French Commission of 1785,

as well as of a later one in 1831, and subsequent exposures, vague theories of magnetic influence, odylic force, new imponderable substance, electro-biology, or the like, were constantly recurring, since science had nothing with which to replace them, until the investigations of James Braid, Scottish surgeon, in Manchester, England. In 1841 he went to a mesmeric séance, which seemed to him a mere triumph of imposture over credulity; but returning on another occasion to watch the details more narrowly, he was surprised to find that the patient was really unable to keep his eyes open. After some reflection, he concluded that by continuous staring, the eyes with their nerve centres became fatigued, and the balance of the nervous system was thus destroyed. Resorting to experiment, he at once succeeded in throwing his servant and others into thorough mesmeric sleep by simply inducing them to gaze intently for a few minutes at the mouth of a bottle placed above, but close to, the eyes. He thus proved the absolute dependence of the mesmeric phenomena on the physiological condition of the patient, not on that of the operator; and found that he had thenceforth to deal with a new order of cerebral states, thereafter to be classed with those of sleep, somnambulism, and insanity. He therefore proposed the word hypnotism, which now so advantageously replaces the terms animal magnetism and mesmerism. Braid investigated the subject with great thoroughness and success for some years, and attempted the treatment of certain diseases by inducing hypnotism. Unfortunately, however, the evil reputation which the subject had obtained, prevented the due appreciation of Braid's discoveries, and it was not until about 1875 that the subject began to be thoroughly investigated by physiologists. Preyer and Heidenhain in Germany, and Richet in France, have confirmed and extended Braid's results. Charcot and his followers regarded hypnosis as an evidence of hysteria and recognized three stages, lethargy, catalepsy and somnambulism. Bernheim has shown that most normal persons can be hypnotized, that the condition is not necessarily hysterical, but that it is due simply to suggestion. It is to be premised that no scientific observer has ever convincingly confirmed the statements of mesmerists as to clairvoyance, reading of sealed letters, influence on unconscious persons at a distance, or the like; and, in cases as above stated, the influence of the mesmerizer is often unnecessary.

When fixation of the eyes is used to induce the hypnotic sleep, the physiological changes which are set up are sometimes as follows: A spasm of the accommodating apparatus first takes place, the pupils meanwhile dilating, and the eyeballs being protruded, while the eyelids droop. Respiration and circulation become greatly accelerated, and perspiration frequently ensues. Finally, profound stupor may ensue. A very remarkable degree

of insensibility to pain exists, so that even surgical operations may sometimes be performed as well as under chloroform. The reflex irritability of all the voluntary muscles is greatly increased (indeed, for days after the experiment), so that stroking an area of skin produces a spasm of the subjacent muscles, which may even spread over the whole body, producing a perfectly cataleptic rigidity, so that Heidenhain, indeed, considers the hypnotic state as nothing more than an artificially produced catalepsy. These considerations indicate the danger of repeatedly subjecting the same person to hypnotic experiments, lest the abnormal state should be rendered permanent. Moreover, since in some persons the hypnotic state begins with general convulsions, the non-medical reader is warned against attempting to hypnotize.

No one method works equally well with all persons. When they can be used, certain other methods, e.g., stroking the head, holding the hand, 'talking sleep,' listening to the ticking of a watch, are preferable to fixation of the gaze, because less apt to leave fatigue and unpleasant after-effects. Any fixation of attention will serve.

During hypnotism, consciousness is apparently narrowed. Attention is seemingly concentrated with great intensity upon the suggestions made by the operator. The patient may, if only slightly affected, remember what has happened; if more fully hypnotized, he has no remembrance of his actions until hints are given; in the most complete state, he has no remembrance whatever. In hypnosis, the patient can by suggestion be rendered extensively anæsthetic, so that he does not feel a pin-prick, or his senses may be made unusually acute. Reflex action, however, goes on more freely in the absence of the inhibiting will; and the patient may be induced to imitate every movement, however absurd or trivial, which is presented to him. The tendency to mimicry, so common, especially in children, monkeys, parrots, etc., is thus intensified, or, rather, the stimulus of the sensory impression is allowed to work unchecked.

As sometimes in ordinary sleep, but with ease and certainty, dreaming may be induced. Thus the medium may be conducted through all the stages of a journey, may be plunged into grief or raised to exuberant happiness by a few judicious suggestions. This state is nearly related to that of 'automatism at command,' where the medium obeys orders like a docile dog. Thus, as a crucial experiment, Heidenhain ordered his brother, a young medical student, to cut off his whiskers, the product of a year's assiduous cultivation, to the great vexation of the youth on awaking. So, too, placing the body in a given position calls up the appropriate actions. A pillow, properly placed in the medium's arms, is nursed like a baby; music makes him dance; and so on. It is doubt-

ful whether suggestions seriously offensive to the moral or æsthetic sense are ever carried out.

The state of the brain during hypnosis is not understood. The normal activity of the cells of the cerebral cortex (with which the functions of consciousness are believed to be specially associated) appears to be partially inhibited by the gentle prolonged stimulation.

Hypnotism, and especially suggestion without actual hypnosis, is again coming into use in medical practice. Many of the minor operations of surgery have been performed on patients in the hypnotized state without pain, and hypnotism has been successfully employed as a therapeutic agent in numerous forms of disease, especially such as have their seat in the nervous system. Its facts have also very important bearings on the phenomena of reverie, trance, somnambulism, mania, religious excitement, spiritualism, etc. See Moll, *Hypnotism;* Hack Tuke's *Dictionary of Psychological Medicine;* Bernheim's *Suggestive Therapeutics.* See SOMNAMBULISM, etc.

HYPNUM, *hĭp'nŭm:* genus of mosses, which contains many common species, growing on moist ground, in woods, on old trees, etc. Many species have stems of considerable length and much branched. The fruit-stalk springs from a lateral tubercle. The *peristome* (see MOSSES) is double, the exterior of 16 teeth, the interior a membrane divided into 16 segments, with alternate cilia.

HYPO, *hī'pō,* or HYP, *hĭp* [Gr. *hūpŏ,* under]: a prefix signifying *under; beneath;* indicating *a less quantity;* implying *diminution,* or *inferiority.*

HYPOBLAST, n. *hī'pō-blăst* [Gr. *hupo,* under; *blastos,* a bud, a germ]: the under layer of the blastoderm; a fleshy body, or thick discoid, near the bottom of the dimple or hollow of the perisperm in the seed of the gramineæ. HY'POBLAS'TIC, a. *-blăs'tĭk,* of or pertaining to.

HYPOCAUST, n. *hĭ'pō-kawst* [Gr. *hupo,* under; *kaustos,* that may be burnt]: among the *Greeks* and *Romans,* an arched chamber in which a fire was kindled for the purpose of heating the baths or rooms, etc., above it; the fireplace of a stove. The smoke and heated air from the hypocaust were made to circulate round the walls and under the floor of rooms above, through hollow tubes or a hollow lining. The full benefit of the fire was thus obtained, in place of a large portion of the heat being allowed to escape immediately through the chimney. The Romans invariably used this form of furnace for heating their dwelling-houses, and in all the Roman houses which have been discovered in Britain, remains have been found of the hypocaust. It is now coming again into use for heating the so-called 'Turkish Baths.'

HYPOCHÆRIS, *hī-pō-kē'rĭs:* genus of plants of nat.

ord. *Compositæ*, sub-ord. *Cichoraceæ*, of which one species, *H. radicata*, or Long-rooted Cat's-ear, is common in meadows and pastures in some countries. Its leaves are all radical, and spread on the ground, resembling in form those of the dandelion, but rough; the stem is branched, the flowers not unlike those of the dandelion, but smaller. Cattle eat this plant readily, and its abundance is not deemed injurious to pasture or fodder.

HYPOCHILIUM, n. *hī'pō-kĭl'ĭ-ŭm* [Gr. *hupo*, under; *cheilos*, the lip]: in *bot.*, the lower part of the labellum of orchids.

HYPOCHLOROUS ACID, *hī-pō-klōr'ŭs* (HClO): dark red fluid, which, at a temperature of about 70°, becomes converted into an orange-colored gas, which very readily explodes into its ultimate constituents. A watery solution of this gas has a penetrating, chlorine-like odor, a caustic action on the tongue, colors the skin brown, and if applied for any length of time, causes it to ulcerate. It is the active ingredient of the different bleaching-powders and salts. Its salts—the hypochlorites—have much the same odor as the acid. Their solutions bleach organic pigments, such as litmus and indigo, and are used largely as bleaching agents.

HYPOCHONDERS, *hī-pō-kŏn'dėrz* [see HYPOCHONDRIUM]: the two lateral and superior regions of the abdomen (q. v.) under the cartilages of the false ribs, and to the right and left of the epigastrium.

HYPOCHONDRIASIS, *hī-pō-kŏn-drī'a-sĭs* [so called from its supposed connection with the hypochondriac region of the abdomen where the liver lies]: disease characterized by extreme increase of sensibility, palpitations, morbid feelings that simulate a great variety of diseases, exaggerated uneasiness and anxiety, chiefly in what concerns the health, etc. In extreme cases it becomes a species of insanity. The disease is intimately connected with, if not caused by, disorder of the digestive functions. When sombreness of disposition and anxiety concerning personal comfort become exaggerated, and attention is directed chiefly to the state of the health, it amounts to common hypochondriasis. When it passes beyond the control of the will, when the whole mind is directed to the state of the system, or to particular organs, and when it exalts and misinterprets sensations, the condition is designated hypochondriacal insanity.

HYPOCHONDRIUM, n. *hĭp'ŏ-kŏn'drĭ-ŭm*, HYP'OCHON'DRIA, n. plu. *-drĭ-ă* [L. *hypochon'drĭă*—from Gr. *hupŏchŏn'drĭă*, the viscera that lie under the cartilage of the breastbone—from *hupo*, under; *chondros*, cartilage]: the part of the belly under the short ribs containing the liver on the right and the spleen on the left. HYP'OCHONDRI'ASIS, n. *drī'ă-sĭs*, a form of disease, amounting sometimes to insanity, characterized by morbid

anxiety, concerning the health (see above). HYP'OCHON'DRIAC, a. *-drĭ-ăk,* or HYP'OCHONDRI'ACAL, a. *-drī'ă-kăl,* affected by depression of spirits or melancholy. HYP'OCHON'DRIAC, n. one who is affected with hypochondriasis and a prey to imaginary diseases. HYP'OCHONDRI'ACALLY, ad. *-lĭ.* HYP'OCHONDRI'ACISM, n. *-sĭzm,* the disease hypochondriasis; melancholy; disordered imagination.

HYPOCRISY, n. *hĭ-pŏk'rĭ-sĭ* [L. *hypoc'rĭsĭs*—from Gr. *hŭpŏk'rĭsis,* the action of a player personating another, dissimulation—from *hupo,* under; *krīnō,* I judge or discern]: a feigning to be what one is not, especially as regards religion; concealment of one's real character or motives. HYPOCRITE, n. *hĭp'ŏ-krĭt,* one who feigns to be what he is not; a dissembler. HYP'OCRIT'IC, a. *-ĭk,* or HYP'OCRIT'ICAL, a. *-ĭ-kăl,* assuming a false and deceitful appearance. HYP'OCRIT'ICALLY, ad. *lĭ.*—SYN. of 'hypocrite'; pretender; cheat; deceiver.

HYPODERMIC, a. *hī'pō-dėr'mĭk* [Gr. *hupo,* under; *derma,* the skin]: applied or inserted under the skin. HYPODERMA, n. *hī'pō-dėr'mă,* in *bot.,* the layers of tissue lying beneath the epidermis, and serving to strengthen it. HY'PODER'MAL, a. *-măl,* under the skin. HYPODERMIS, n. *hī'pō-dėr'mĭs,* in *bot.,* the inner layer of moss thecæ. HYPODERMIC INJECTION, method of introducing medicines into the subcutaneous cellular tissue by means of a very finely pointed syringe. (For the method formerly in use, see ENDERMIC). The science of medicine is indebted to Dr. Alexander Wood of Edinburgh for its invention. It is chiefly, but not solely, to anodynes that these methods are especially applicable. It has been found that morphia given by Dr. Wood's method acts more speedily and more powerfully than when given by the mouth: moreover, the medicine given in this way does not disturb the functions of the stomach, and may be administered in those cases of irritation of that organ in which medicines introduced into it would be rejected by vomiting. A solution of acetate of morphia, carefully freed from any excess of the acid, and of such strength that three minims shall contain one-third of a grain, is commonly employed, the dose varying from one to three minims, or from one-ninth to one-third of a grain of salt. If the general effects of the morphia (as relief of pain, and sleep) are required, any convenient part of the body, as, for instance, the fore-arm, may be selected: the skin, pinched up between the fore-finger and thumb of the left hand is penetrated by the point of the syringe, and the solution injected. When a local action is required, as in the case of various forms of neuralgia, the solution should be injected as near as possible to the seat of pain. As some patients are remarkably susceptible to the action of morphia administered in this method, physicians find it advisable to begin with the smallest of the above-named doses.

A scientific committee appointed by the Royal Medical

and Chirurgical Soc. of London to investigate the physiological and therapeutical effects of the hypodermic method of injection, reported 1867. Among the most important *physiological* facts observed were the following: Watery solutions of drugs subcutaneously injected were far less rapid in their action than when they were introduced into a vein. On comparing the effects of medicines subcutaneously injected with those produced when they were administered by the mouth, or by injection into the lower bowel, it was found that in the case of some drugs, the local action was different according to the mode of administration, though the general effects produced were of the same kind. Thus, aconitine given by the mouth affected the salivary glands; when given by the rectum, it caused irritation of the gut; and when given by the skin, it occasioned local pain. The smallest dose fatal to rabbits was by the mouth, 1/60, by the rectum, 1/50, and by the skin, 1/300, of a grain: it was thus five times as energetic when given subcutaneously as when given in the most usual way. The effects of morphia when injected under the skin were also more rapidly manifested and more intense than when given by the mouth or rectum. A solution of podophyllin, which, when administered by the mouth, acts as a powerful cholagogue (bile-provoking) aperient, when injected into the skin, gives rise to free action of the kidneys. The investigations of the *therapeutic* value of this mode of administering drugs were limited by the fact that many substances (aconitine, for example) give rise to great local irritation when used subcutaneously. In cases of simple neuralgia, atropine was found to have a very beneficial effect when thus given, and in some cases more permanent relief followed its injection than that of morphia. The value of the latter drug was found to be much increased by this method, the required action being of longer duration, and being produced with greater rapidity and intensity. The same advantages followed this mode of giving quinine in intermittent fevers, but caution is requisite in giving large doses, as irritation may arise from its presence under the skin. Among the conclusions at which the committee arrives are the following: (1) That, as a general rule, only clear neutral solutions of drugs should be employed, decidedly acid or alkaline solutions being apt to cause irritation, and even local ulcers, at the point of application; (2) that, as in the case of podophyllin, symptoms are observed to follow the administration of some drugs by the skin, which are absent when the same drugs are otherwise administered; and (3) that the advantages to be derived from this method of introducing drugs are (*a*) rapidity of action, (*b*) intensity of effect, (*c*) economy of material, (*d*) certainty of action, (*e*) facility of introduction in certain cases, and (*f*) in some drugs, the avoidance of unpleasant symptoms. It ought to be understood that

hypodermic injections, though often greatly beneficial at the hand of a careful physician, involve various dangers, either immediate or consequent, if resorted to by others.

HYPOGASTRIC, a. *hī'pō-găs'trĭk* [mid. L. *hypogas'-trĭcus*—from Gr. *hupo,* under; *gastēr,* the belly]: relating to the middle part of the lower region of the belly, called the HY'POGAS'TRIUM, n. *-trĭ-ŭm.*

HYPOGENE, a. *hī'pō-jēn* [Gr. *hupo,* under; *gennăō,* I produce]: term applied to the whole family of crystalline rocks, whether stratified or unstratified, plutonic or metamorphic, which have not assumed their present form and structure near the surface. Lyell proposed the term for use instead of the term *primary,* which he deemed inappropriate, because some granites are of more recent formation than some secondary rocks.

HYPOGEUM, n. *hī'pō-jē'ŭm* [Gr. *hupo,* under; *gē,* the earth]: the underground parts of a building. HY'POGE'A, n. plu. *-jē'ă,* subterranean structures hewn out of the rocks which abound along the Nile throughout the Libyan ridge of hills, and under the contiguous plains of sand. HY'POGE'OUS, a. *-ŭs,* and HY'POGE'AL, a. *-ăl,* under ground; subterranean; in *bot.,* applied to the parts of plants growing beneath the surface of the soil.

HYPOGLOSSAL, a. *hī'pō-glŏs'ăl* [Gr. *hupo,* under; *glossa,* the tongue]: situated beneath the tongue; pertaining to the ninth pair of nerves, or the lingual nerve.

HYPOGYNOUS, a. *hī-pŏj'ĭ-nŭs* [Gr. *hupo,* under; *gŭnē,* a female]: in *bot.,* inserted below the ovary or pistil. HYPOGYN, n. *hī'pō-jĭn,* a hypogynous plant.

HYPONASTY, n. *hī'pō-năs-tĭ* [Gr. *hupo,* under; *nastos,* pressed together, stuffed]: in *bot.,* a form of nutation when the organs grow most rapidly on the dorsal side.

HYPOPHLŒODAL, a. *hī'pō-flē'ŏ-dăl* [Gr. *hupo,* under; *phloios,* bark]: in *bot.,* existing beneath the epidermis of the bark.

HYPOPHOSPHITES, n. *hī'pō-fŏs'fīts* [Gr. *hupo,* indicating a *less quantity;* Eng. *phosphorus*]: the salts of hypophosphorous acid (q. v.), much used in medicine. Sodium H., $NaH_2PO_2 + H_2O$, may be prepared by acting upon caustic soda with phosphorus, phosphoretted hydrogen being given off, while sodium hypophosphite remains in solution. It crystallizes in small, rectangular tablets, which are easily soluble in water and in absolute alcohol. The evaporation of solutions of this substance is often attended by explosions. Barium H., $Ba(H_2PO_2)_2 + H_2O$, may be prepared by heating baryta, BaO, with phosphorus and water until the elimination of phosphoretted hydrogen has ceased, the excess of BaO being then removed by a current of carbon dioxid, after which the solution is filtered and crystallized. Barium H. crystallizes in monoclinic needles, which are soluble in water, but insoluble in alcohol. Calcium H. may be prepared in the

same manner as the barium salt. It has the formula $Ca(H_2PO_2)_2$, and crystallizes in thin, monoclinic tablets, which are soluble in six parts of water, but insoluble in strong alcohol. The hypophosphites are used in medicine as 'nerve tonics,' under the impression that they readily yield up the phosphorus existing in them in a low state of oxidation. For this purpose they are given in neuralgia, neurasthenia, in pulmonary tuberculosis and in other conditions of lowered nutrition. The hypophosphites of calcium, sodium, potassium, and iron are those used in medicine and official in the U. S. Pharmacopœia.

HYPOPHOSPHOROUS ACID, *hī-pō-fŏs'fŏ-rŭs,* H_3PO_2, an oxyacid of phosphorus. It may be prepared by decomposing barium hypophosphite with sulphuric acid, and evaporating the solution at a temperature not exceeding 230° F. It crystallizes in large white tablets, which melt at 63° F., and are decomposed by heat, with the formation of phosphoretted hydrogen and ordinary tribasic phosphoric acid. It is a monobasic acid, only one of its hydrogen atoms being replaceable by a metallic atom. The free acid is of no importance in the arts; its salts, the hypophosphites (q. v.) are used in medicine.

HYPOPYON, HYPOPYUM, n. *hī-pō'pĭ-ŭm* [Gr. *hupo,* under; *puon,* pus]: in *pathol.,* collection of purulent matter in the anterior chamber of the eye or between the layers of the cornea.

HYPOSPADIAS, n. *hī'pō-spā'dĭ-ăs* [Gr. *hupo,* under; *spădīzō,* I pull or tear off]: a malformation of the urethra which opens on the under surface of the penis instead of at the extremity of the glans.

HYPOSTASIS, n. *hī-pŏs'tă-sĭs,* HYPOS'TASES, n. plu. *-sēz* [Gr. *hupo,* under; *stăsĭs,* a placing, a standing: L. *hypostăsĭs*]: distinct personality with joint dependence—applied to the Trinity; individual particular being; a common nature or essence. HY'POSTAT'IC, a. *-pō-stăt'ĭk,* also HY'POSTAT'ICAL, a. *-ĭ-kăl,* personal or distinctly personal; relating to the union of the divine and human natures in the person of Christ. HY'POSTAT'ICALLY, ad. *-lĭ.* HYPOSTATIC UNION, union of natures or substances so intimate as to constitute one undivided person. The term is used in theology to describe the mysterious union of the divine and human natures in Christ.

HYPOSTYLE, n. *hī'pō-stīl* [Gr. *hūpŏstŭlŏn*—from *hupo,* under; *stūlŏs,* a pillar]: in *arch.,* a covered colonnade; a pillared court or hall.

HYPOSULPHITE, n. *hī'pō-sŭl'fīt* [Gr. *hupo,* under; Eng. *sulphite*]: a compound of hyposulphurous acid with a base. HY'POSUL'PHUROUS, a. *-fū-rŭs:* applied to an acid containing less oxygen than sulphurous acid. The free acid is only known in solution. SODIUM HYPOSULPHITE, its most important salt, $Na_2S_2O_4$, is formed by the action of zinc on sodium hydrogen sulphite

$NaHSO_3$. The action of the zinc is one of REDUCTION (q. v.), two molecules of the sulphite eliminate one molecule of water and an atom of oxygen and form the hyposulphite. Sodium Humus is largely used in calico printing and dyeing, as a reducing agent, to discharge color from the places or material to which it is applied. The term is sometimes given, in error, to *Sodium Thiosulphate.* See THIOSULPHATE.

HYPOTENUSE, n. *hī-pŏt'ĕ-nūs,* also incorrectly HYPOTHENUSE, n. *hī-pŏth'ĕ-nūs* [L. *hypotenūsă;* Gr. *hūpŏteinou'sa,* the subtending line—from Gr. *hūpŏtei'nō,* I tend—from *hupo,* under; *teinō,* I stretch out, I lay along]: the longest side of a right-angled triangle, or the side opposite the right angle. The well-known property of the hypotenuse, that the square described on it is equal to the sum of the squares described on the other two sides, is proved in the famous 47th proposition of the first book of Euclid's *Elements,* and has, in the sixth book, been generalized into the following form: the figure described on the hypotenuse is equal to the similar figures described on the other two sides.

HYPOTHALLUS, n. *hī'pō-thăl'lŭs,* HY'POTHAL'LI, n. plu. *-thăl'lī* [Gr. *hupo,* under; Gr. *thallos;* L. *thallus,* a young shoot or branch]: delicate fungoid filaments, upon which a lichen thallus is first developed.

HYPOTHEC, n. *hī-pŏth'ĕk* [F. *hypothèque,* a mortgage, a pawning of an immovable—from mid. L. *hypŏthēcă*—from Gr. *hūpŏthēkē,* a pledge not delivered, a mortgage—from *hupo,* under; *tĭthēmī,* I put or place]: term in the law of Scotland, from the old Roman law, to denote a lien or security over goods in respect of a debt due by the owner of the goods: Thus a landlord has a hypothec over the furniture or crops of his tenant in respect of the current rent. (See LIEN; LANDLORD AND TENANT.) HYPOTH'ECATE, v. *-ĕ-kāt,* to assign in pledge as security. HYPOTH'ECATING, imp. HYPOTH'ECATED, pp. HYPOTH'ECATOR, n. *kā'tėr,* one who. HYPOTH'ECA'TION, n. *-kā'shŭn,* a term used in civil law to denote a creditor's right over a debtor's property: the power to cause it to be disposed of by sale that he may secure his payment from the proceeds. There are various forms of hypothecation recognized by law: Conventional hypothecation, or those effected by the agreement of parties; general hypothecation, as when a debtor hypothecates his entire estate for the benefit of his creditors; legal hypothecation, those that are not dependent upon a contract or agreement; special hypothecation, or the hypothecation of a special estate; and tacit hypothecation, as when ordered by the court to secure a debtor's creditors.

HYPOTHECIUM, n. *hī'pō-thē'shĭ-ŭm* (Gr. *hupo,* under; *thēkē,* a case]: the cellular disk beneath the thalamium in lichens, which bears the thecæ.

HYPOTHENAR EMINENCE, *hī-pŏth'ĕ-nâr* [Gr. *hupo*, under; *thĕnar*, the palm of the hand]: the fleshy mass at the inner border of the hand, consisting of three muscles passing to the little finger.

HYPOTHESIS, n. *hī-pŏth'ĕ-sĭs* [Gr. *hūpŏthĕsĭs*, foundation, supposition—from *hupo*, under; *tĭthēmī*, I put or place, I suppose]: something assumed for the purpose of argument; a system or theory put forward to account for something not understood. HYPOTH'ESES, plu. *-sēz*. HY'POTHET IC, a. *-thĕt'ĭk*, also HY POTHET'ICAL, a. *-ĭ-kăl*, assumed; conditional. HY'POTHET'ICALLY, ad. *lĭ*.—*Hypothesis* is much employed in natural science. In endeavoring to explain natural phenomena, we have often to assume or imagine a cause, which, in the first instance, we do not know to be the real cause, but which may be established as such when we find that its consequences agree with the phenomenon to be explained. Every genuine theory was at one stage a mere conjecture, and became a true theory in consequence of being proved or verified by the proper methods. Thus, when it occurred to Newton that the force of gravity on the earth, as exemplified in falling bodies, might extend to the distance of the moon, and might be the power that compelled it to circle round the earth, instead of going off in a straight line through space, the suggestion was only an hypothesis, until such time as he was able to show that it accounted exactly for the facts, and then it became a theory.

A difference of opinion has arisen as to what constitutes a legitimate hypothesis, there being manifestly some necessary limits to the process of imagining possible causes. The case that has chiefly contributed to make this a question is the celebrated undulatory theory of light, a theory, or hypothesis rather, remarkable not only for the extent to which it explains the facts, but for having led to the discovery of new facts by way of inference from the theory itself. Notwithstanding all this amount of coincidence, the ethereal substance whose undulations are supposed to constitute light in its passage from the sun to the earth, is not known to have a real existence. It is an imaginary element, so happily conceived as to express with fidelity a series of extremely complicated phenomena. This was not the character of Newton's hypothesis as to the motion of the moon; the power supposed by him (the earth's gravity) was an actual or existing force, and was known as such; all that he did was to suggest that it extended as far as the moon. Accordingly, Auguste Comte and J. S. Mill have laid it down as the condition of a sound scientific hypothesis, that the cause assigned to the phenomenon in question should be either a real cause, or capable of being ascertained to be a real cause, and that the liberty given to the scientific inquirer should be confined to imagining its operation in a particular sphere, and the law and amount of its operation, since both these could be verified by experiment and calculation. On the other hand, Dr. Whewell has contended that an amount of agreement with observed facts, such as has been exemplified by the

undulatory hypothesis, is sufficient to establish not merely a hypothesis, but a theory, at least until such a time as some discordant facts arise, when the theory must be modified or abandoned. But whatever name be given to this class of suppositions, it is evident that they must be deemed inferior in scientific value to the other class of suppositions, where no cause or agent is assumed but what is actually known to exist, and where the only question is, the presence of that agent in such manner and amount as to tally with the observed facts. Gravity, heat, electricity, magnetism, are established natural agents, and when we assume any one of these as the cause of some phenomena, we are on safe ground so far, that if it be once shown that they are actually operative in the case that we are dealing with, and that their calculated effect exactly coincides with the observed effect, the explanation is complete and final: no subsequent discovery can disturb a conclusion established in this way. But if we have to assume the very agency itself, or to imagine a power of which we have no experience, the coincidence between the laws of the assumed agency and the laws of the phenomena produces at best but a temporary or provisional evidence, liable to be superseded whenever a still better imagined machinery shall be brought forward. Thus, in the case of light, the first hypothesis, that of Newton himself, was a stream or shower of corpuscles; this gave way to the undulatory ether, whose merit lay in embracing the facts more closely; but we have no security against the ultimate preference of some third supposition which shall displace the second, as that did the first; while, perhaps a day may come when an agency shall be proved to exist capable of explaining the phenomena. Even granting that we must sometimes assume an unknown agent (when an effect seems to be beyond the power of all the recognized forces), yet, in ordinary researches, it is considered a grave objection if the assumed agent be of such a subtle or occult nature, or so far removed from observation, that its existence does not admit of being proved. Such was the doctrine of the Cartesian vortices, and such are any hypotheses as to the shapes, sizes, and distances of the ultimate atoms of matter. Such also is the doctrine of nervous fluids, whereby the impulses of mind are supposed to be propagated between the brain and the other parts of the body. It is now in question whether the doctrine of evolution *as an explanation of the physical universe*, is an established theory, or a hypothesis. Cautious thinkers, noting that some elements which it involves still await verification, while some elements are by their nature scarcely verifiable in man's present state of knowledge, deem it one of the most brilliant, comprehensive, and stimulating hypotheses that the human mind has conceived. Less cautious thinkers are either on the one hand asserting it as proved, or on the other hand denying its possibility. It is safe to class it among hypotheses.

HYPOTRACHELIUM, n. *hī'pō-trā-kē'lĭ-ŭm* [Gr. *hupo*, under; *trăchēlŏs*, the neck]: in *arch.*, that part of the

capital of a column which occurs between the shaft and the annulets of the echinus.

HYPOTYPOSIS, n. *hī'pō-tī-pō'sĭs* [Gr. *hupo*, under; *tupos*, a type]: highly descriptive language; imagery.

HYPOXANTHIN, or HYPOXANTHINE, n. *hī'pō-zănth'ĭn* [Gr. *hupo*, under; *xanthos*, yellow]: organic substance found in the spleen and muscles of the heart of man, and in the spleen and blood of the ox; a white crystalline powder, almost insoluble in cold hydrochloric acid, very slightly soluble in boiling alcohol, and requiring for solution in water 1,090 equivalents of cold, or 180 of boiling water. Its solution has a neutral reaction.

HYPOZOIC, a. *hī'pō-zō'ĭk* [Gr. *hupo*, under; *zōŏn*, an animal]: in *geol.*, applied to those rocks which have as yet yielded no organic remains, and which lie beneath the undoubtedly fossiliferous strata.

HYPPISH: see HIPPISH.

HYPSILAN'TIS: see YPSILANTI.

HYPSISTARIANS, n. *hĭp-sĭs-tär'ĭ-anz* [Gr. *hupsi*, high, aloft; Eng. *arians*]: in *chh. hist.* and *eccles.*, sect of heretics in Cappadocia, 4th c.; their leading principle was the recognition of God as the 'Most High.' Rejecting sacrifices, circumcision, pictures, and images, they observed the Jewish Sabbath and Jewish distinctions as to clean and unclean food, and like the Magians, used fire and lights as symbols of the Deity.

HYPSOMETRY, n. *hĭp-sŏm'ĕ-trĭ* [Gr. *hupsos*, height; *metron*, a measure]: the method of ascertaining heights by the barometer or by boiling water. HYP'SOMET'RICAL, a. pertaining to. HYPSOMETER, n. *hĭp-sŏm'ĕt-ĕr*, an instrument for measuring heights: see HEIGHTS, MEASUREMENT OF.

HYPSOPHYLLARY, a. *hĭp'sō-fĭl'lĕr-ĭ* [Gr. *hupsos*, top, summit; *phullon*, a leaf]: in *bot.*, applied to leaves which are bracts.

HYRAX, n. *hī'răks* [Gr. *hurax*, the shrew-mouse, a rat]: the rock-badger or rock-rabbit, a small animal not much bigger than a hare, remarkably assimilated to the rhinoceros and tapir; the supposed *coney* of Scripture (see DAMAN). HYRACEUM, n. *hī-rā'sē-ŭm*, peculiar substance found in the crevices of the rocks of Table Mountain, Cape of Good Hope. It is one or more of the excrements of the Cape Hyrax (*Hyrax Capensis*): see DAMAN. Hyraceum is a blackish-brown viscid material, not unlike soft pitch, having a strong and offensive taste, not unlike castoreum, for which it has been used as a substitute in medicine. At one time, so large a quantity was found as to suggest the idea of its being used as a manure, but the supply was soon exhausted, and only a small quantity is now imported to meet the demand of the curious pharmaceutist. HYRACOTHERE, *hī'ra-kō-thēr*, animal of the genus Hyracotherium. HYRACOTHERIUM, n. *hi-rā-kō-thē'rĭ-ŭm* [Gr. *thērĭŏn*, a wild beast]: in *geol.*, genus of small fossil Pachydermata, belonging to the division Perrysodactyla, the animals of

which are characterized by having an odd number of toes. The genus was founded by Owen on the fragmentary remains of two species found in Lower Eocene strata; a third species from the same beds has been since described by him from more complete materials, under the name *Pliolophus vulpiceps;* he considers it only a sub-genus, and as no characteristics appear to separate it generically from the other two, it is here placed as a true hyracothere. The fossil was discovered in a nodule from the Roman cement bed of the London Clay near Harwich, England. It is the most complete Eocene mammalian fossil of the London Clay. It consists of an entire skull and a portion of the rest of the skeleton, including the right humerus and femur, a great part of the left femur, the left tibia, and three metatarsal bones, apparently of the same foot, besides fragments of pelvis, ribs, and vertebræ. The head (fig. A 1 and A 2) is 5 inches long, and 2 inches 2 lines broad; it is slender, tapering gradually from the zygomatic region to the muzzle;

Hyracotherium:

A 1, A 2, skull of *Hyracotherium* (*Pliolophus*) *vulpiceps* (one-third natural size). A 3, molar tooth (natural size).

B 1, B 2, skull of *H. leporinum* (one-third natural size). B 3, molar tooth (natural size).

C 1, portion of lower jaw and tooth of *H. cuniculus* (natural size). C 2, molar tooth (natural size).

the upper outline is straight; the bony rim of the orbit is incomplete behind for about one-fifth of its circumference. The narrow skull and incomplete orbit ally it to the Palæothere; the same form of orbit occurs also in the rhinoceros, and more exactly in the tapir. The straight contour of the skull, and the structure of the nasal aperture, show affinities with the horse and hyrax. The third molar of the upper jaw (fig. A 3) shows the structure of the teeth.

The teeth, as well as the form of the lower jaw, show the herbivorous character of the hyracothere. The bones of the leg exhibit ungulate affinities, and their form and proportions are between those of the hyrax and the tapir. The second species was founded on a mutilated cranium (fig. B 1, B 2), rather larger than a hare's, found in the cliffs of London Clay near Herne Bay. It shows a skull very like the first species, though broader at the orbital region. The third molar tooth (fig. B 3) has a larger number of cones than the same tooth in the first species. The third species was founded on several teeth which belonged to a smaller animal than either of the others, found in the Eocene sand underlying the Red Crag at Kyson, in Suffolk. The molar (fig. C 2) has a structure similar to that of the others figured. From the same deposit were obtained two teeth belonging to a lower jaw, one of them, the third molar, still in its socket, and having a fragment of the jaw attached to it (fig. C 1). These teeth were considered by Owen to belong to a quadrumanous animal, and were described by him as *Macacus Eocænus*, 'at once the first terrestrial mammal which has been found in the London Clay, and the first quadrumanous animal hitherto discovered in any country in Tertiary strata so old as the Eocene period.' On the strength of this statement, speculative geologists made good service of this 'monkey.' Owen soon, however, assured himself that the two teeth belong to the third species of hyracothere.

HYRCANIA, *hėr'kā-nė-a:* ancient dist. of Asia; bounded n. by the Caspian Sea (sometimes called *Hyrcanum Mare*) and the Ochus river; e. and. s. by the Sariphi Mountains (now Elburz), which separated it from Parthia; w. by Media. It corresponds with the modern Mazanderán and Asterabad. With the exception of the coast districts, and valleys among the hills, which produced corn, oil, and wine, it was not fertile; dense forests prevailed, through which roamed multitudes of savage animals, the Hyrcanian tiger in particular being celebrated. The inhabitants were of the same stem as the Parthians, and were noted for their wild and rude character.

HYRCANUS, *hėr-kā'nŭs,* JOANNES (or JOHN) I., Jewish high-priest, prince of the Asmonean family: (ruled B.C. 135–105); d. B.C. 105; youngest son of Simon Maccabeus. He was at first tributary to the Syrians; but on the death of Antiochus, made himself independent, subdued the Samaritans on the n., and forced the Idumæans on the s. to adopt the laws and customs of the Jews. He also concluded an alliance with the Romans, or rather confirmed that which his father had made; built the fortress of Baris on the n.e angle of Mount Moriah, and extended his territories almost to the ancient limits of the Davidian monarchy. He is also supposed to have founded the Sanhedrim (q.v.). Originally a Pharisee, he subsequently attached himself to the party of the Sadducees, who were anxious to keep on good terms with the Romans, and who discountenanced the turbulent religious patriotism of the

Jewish masses. Hyrcanus was, comparatively speaking, a just and enlightened ruler, and the country prospered during his reign. He left five sons, of whom Aristobulus (the eldest) and Alexander governed with the title of king.

HYRCA'NUS, JOANNES (or JOHN) II., Jewish high-priest, prince of the Asmonean family: (ruled B. C. 78-40); d. B. C. 30; son of Alexander Jannæus by his wife Alexandra, and grandson of John Hyrcanus I. He was a feeble prince. On the death of his father (B. C. 78) he was appointed high-priest by his mother Alexandra, who ruled Judea herself for the next nine years. After her death (B. C. 69), his younger brother, Aristobulus, braver and more energetic, seized the government, and forced Hyrcanus to withdraw into private life. Induced by the Idumæan, Antipater, and aided by Aretas, King of Arabia Petræa, he endeavored to win back his dominions, but was not successful until Pompey began to favor his cause. After years of tumultuous fighting, Aristobulus was poisoned by the partisans of Ptolemy (B. C. 49), and Hyrcanus, who had for some time held the nominal dignity of high-priest and ethnarch, was now deprived of the latter of these offices, for which he was wholly incompetent. Cæsar (B. C. 47), on account of the services rendered to him by Antipater, made the latter procurator of Judea, and thus left in his hands all the real power, Hyrcanus busying himself only with the affairs of the priesthood and temple. Troubles, however, were in store for him. Antipater was assassinated, and Antigonus, son of Aristobulus, with the help of the Parthian king, Orodes I., invaded the land, captured Hyrcanus by treachery, cut off his ears, and thus disqualified him for the office of high-priest, and carried him away to Seleucia on the Tigris. Some years later, Herod, son of his old friend Antipater, obtained supreme power in Judea, and invited the aged Hyrcanus home to Jerusalem, B. C. 33. He was allowed to depart, and for about three years lived in ease and comfort; but falling under suspicion of intriguing against Herod, was put to death.

HYRTL, *hēr'tl*, JOSEPH: anatomist: born 1811, Eisenstadt, Hungary. He studied at Vienna and early acquired eminence as a scientific anatomist, and for the extreme beauty of his anatomical preparations. He became prof. of anatomy, Prague, 1837, and Vienna, 1845. While yet a student, he enriched the Anatomical Museum of Vienna with many preparations. He has written many books and articles on comparative anatomy, and the anatomy of the ear: of these the two principal are *Lehrbuch der Anatomie des Menschen* (1847, 13th ed. 1875), and *Handbuch der Topographischen Anatomie* (1847, 6th ed. 1871). The former is a text-book in all German universities, and has been translated into various languages. Hyrtl formed a museum of comparative anatomy at Vienna, and became rector of the univ. there, resigning 1874.

HYSLOP, *hĭs'lŏp,* JAMES HERVEY, American scholar and educator: b. Xenia, Ohio, Aug. 18, 1854. He was graduated from Wooster University (Ohio), studied also at Leipsic and the Johns Hopkins University, taught successfully in Lake Forest University, Smith College, and Bucknell University, and was appointed professor of logic and ethics in Columbia University. He became well known for his connection with the investigations of the Society for Psychical Research, and contributed extensively to its proceedings. His further work includes articles in prominent periodicals; an edition of Hume's *Ethics* (1893) with introduction; a text-book on *The Elements of Logic* (1892); one on *The Elements of Ethics* (1895); *Democracy: A Study of Government* (1899); *Logic and Argument* (1899); and *A Syllabus of Psychology* (1899).

HYSON, n. *hī'sŭn* [Chinese, *hi-tshun,* first crop]: a fine sort of green tea.

HYSSOP, n. *hĭs'sŭp* [L. *hyssōpŭs;* Gr. *hŭssōpŏs*], (*Hyssopus*): genus of plants of nat. ord. *Labiatæ,* distinguished by four straight diverging stamens, and a calyx with 15 ribs. The known species are few. The Common hyssop (*H. officinalis*) is a native of s. Europe and the East. It is found on the Alps of Austria. It is a half-shrubby plant, about 1½ ft. high, the upper part of the stems quadrangular, the leaves evergreen and lanceolate, the flowers in one-sided whorled racemes. The flowers are generally of a very beautiful blue. It has an agreeable aromatic odor. It has long been in cultivation for its leaves and young shoots, which are sometimes used for culinary purposes as a seasoning, but more generally dried as a stomachic and carminative. A syrup made with them is a popular remedy for colds. The virtues of hyssop depend on a volatile soil.—It is very doubtful what plant is the hyssop of the Bible. It has been supposed to be some species of *Phytolacca* (q. v.), as *P. acinosa,* native of the Himalaya; but of late arguments have been advanced in favor of the common Caper (q. v.); and more recently, for a plant allied to the Wild Thyme. HEDGE HYSSOP is *Gratiola officinalis* (see GRATIOLA).

HYSTERANTHOUS, a. *hĭs'tĕr-ăn'thŭs* [Gr. *hustĕros,* after; *anthos,* a flower]: in *bot.,* applied to plants whose leaves expand after the flowers have opened.

HYSTERECTOMY: removal, by operation, of the uterus.

HYSTERESIS: the energy loss which takes place in iron when electrically magnetized from one degree of magnetization (or zero) to a higher degree and then demagnetized again down to the magnetic condition which first existed. (See MAGNETISM.)

HYSTERIA, *hĭs-tē'rĭ-a:* a morbid state of the nervous system in which the clinical manifestations present a

wonderful variety of symptoms closely simulating some forms of organic disease. There is often increased physical irritability; the condition is frequently manifested by neuralgic pains, hyperæsthesias, hallucinations, and convulsive and paralytic phenomena. It may be regarded as a brain affection—a mild insanity.

Among the causes of hysteria heredity plays a most important part. There may be direct transmission of the hysterical temperament from parent to child, or other nervous manifestations in the family and its branches, such as epilepsy, chorea, neuralgia, insanity, etc. It occurs more frequently in women, but it is much more common in men than is ordinarily believed; it occurs in boys and girls at a tender age or about the time of puberty. Briquet found that one-eighth of his cases were in children under ten years of age. Anything which lowers the general tone of the nervous system may give rise to it in predisposed persons. Hæmorrhages, severe illness, poor food, anæmia, overwork in uncongenial occupations, anxiety, fright, jealousy, disappointments make a profound impression; so does an education which fosters and stimulates inherited instability. The enforced social restrictions of women, which they often inflict upon their young children, with lack of proper exercise for physical development and an artificial and premature education and habits heighten this predisposition. Accidents are a frequent cause of the first appearance of hysteria, as has been clearly pointed out by Charcot. The disease may, at times, occur in young girls who have witnessed attacks in others.

To understand the symptoms of hysteria, it must be borne in mind that there are two classes of phenomena. These have been termed the *mental stigmata* and the *mental accidents.* The stigmata are anæsthesias (loss of sensation), amnesias (forgetfulness), abulias (loss of will power), motor disturbances, and modifications of character. These are the cardinal symptom-groups that characterize the mental state of the hysteric. Any or all of the mental accidents may likewise be noted—suggestibility and subconscious acting, fixed ideas, ecstasy, automatism, convulsive movements, sleep-walking, deliriums, etc. The occurrence of these constitutes important corroborative evidences of hysteria and while not found in all hysterics, they may be very common symptoms.

Hysterical persons often complain of some of the symptoms found in neurasthenia—neuralgic pains in various parts and hyperæsthetic areas about the abdomen, chest, or back, frequently in the neighborhood of the ovary, mammary gland, etc. There may be anæsthetic patches in various parts of the body, or there may be complete loss of sensation on one side associated with anæsthesia of the mucous membranes. The special senses on that side are involved—sight, taste, and hearing.

There may be irritations of the bladder and urethra; pain in the joints, which may be mistaken for joint disease.

In some cases the senses are exceedingly acute. Persons notice odors imperceptible to others; are often made sick by odors which do not affect normal individuals; may have a liking for odors and substances disagreeable to others. Perverted sense is shown in an abnormal taste, in eating soap, slate-pencils, etc. Hysterical manifestations in some are simply emotional exaggerations; they laugh and cry without cause. In serious attacks there are likely to be various hysterical manifestations. Occasionally tactile sensibility is disturbed, and the muscular sense may be abolished. The anæsthesia may affect the mucous membranes of mouth, pharynx and nose, abolishing the reflexes of the parts. The secretions may be diminished or arrested.

Spasmodic convulsions and paralytic phenomena may occur. The spasmodic attack may be rhythmic; may simulate the trembling of organic disease; may be confined to one member or involve the entire half of the body; may be coarse, as in disseminated sclerosis, or a fine tremor, as in paralysis agitans, or the tremor may simulate the trembling of organic brain disease. It may occur in any muscle or group of muscles; may manifest itself as contracture, which may be intermittent or may last continuously for months or years. Contracture may be confined to the strong muscle of the jaw and other muscles in their neighborhood, causing trismus. Spasms of the glottis may take place, giving rise to severe difficulty in breathing; or of the pharynx, causing difficulty in swallowing. Globus hystericus is a constant symptom, but is not as frequent as it is often thought to be. Persistent and severe vomiting often occurs, but the nutrition rarely suffers materially from these attacks. Retention of urine is frequent, owing to spasm of the sphincter, and the catheter may have to be used for months.

Paralysis occurs in these cases; it is variable in distribution, and may come on suddenly after a convulsive attack or without it; it may be flaccid or associated with contracture; it may come on slowly; it may be confined to one limb or be hemiplegic in type.

Hysterics are easily affected by pleasurable or painful impressions, and there is often a morbid craving for sympathy and attention. They may show moral perversion; may lie, steal, quarrel with and intrigue against their own family; may form and change attachments and dislikes without obvious reason; may manifest aversions, as to frogs, spiders, mice, cats, etc.; may deceive for deception's sake or to excite wonder. Some are painfully depressed; they have forebodings, or are compelled to do certain acts. Here the hysterical insanities are

approached on the one hand, and the imperative conceptions and neurasthenias on the other.

Hystero-epileptic attacks in their greatest severity are often preceded by general discomfort, or by hallucinations of vision and hearing. Usually sudden, they may be preceded by an 'aura,' globus hystericus, singing in the ear, etc. Breathing is spasmodic; consciousness is obscured; the convulsion may be similar to those of mild epilepsy. In some cases the body is thrown into all sorts of contortions. An extreme opisthotonos may be present, the body being bent backward, resting on the head and heels. Gestures and noises are made. Sometimes religious ideas have an influence over the attitudes assumed; at other times, ideas of demoniacal possession.

From milder forms, recovery is the rule. In graver cases, and when there is a strong neuropathic tendency, the persons will probably pass from one hysterical manifestation to another.

Treatment.—In cases where there is deterioration of the physical health, tonics and nutritious diet should be given. Hydrotherapy improves nutrition and also the mental state. Many drugs have been recommended, but they are all uncertain in their action, at one time giving a result, and failing at another. Convulsive attacks may at times be stopped by the cold douche to the spine. Isolation from the family circle is of the utmost importance in the treatment of these cases. Every effort should be made to discover the psychic shock which has produced the attack. Only the patient may have knowledge of this, and he will not often reveal it. There is no disease the treatment of which it is more difficult to describe. Suggestion-therapy gives by far the best results, but the great difficulty is that good results are rarely permanent.

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HYSTERICS, n. plu. *hĭs-tĕr'ĭks* [OF. *hysterique*—from Gr. *hustĕr'ĭkŏs*, caused by the womb—from *hustĕrĕ*, the womb]: nervous disturbance or affection peculiar to women, called also HYSTE'RIA, n. *-tē'rĭ-ă* (q.v.). HYSTER'IC, a. *-tĕr'ĭk*, or HYSTER'ICAL, a. *-ĭ-kăl*, affected with, or liable to, hysterics. HYSTEROTOMY, n. *hĭs-tĕr-ŏt'ō-mĭ* [Gr. *tŏmē*, a *cutting*]: surgical operation of cutting an unborn infant out of the womb: see CESARIAN OPERATION.

HYSTERON-PROTERON, n. *hĭs-tĕr-ŏn-prŏt'ĕr-ŏn* [Gr. *husteron*, last; *proteron*, before others]: in *rhet.*, figure of speech in which that word which should properly come last is placed first, as *valet atque vivit*, he is well and lives; an inversion of the natural or logical order; as placing the conclusion before the premises, etc.

HYSTEROPHYTA, n. plu. *hĭs'tĕr-ŏf'ĭ-tă*, or HYSTEROPHYTES, n. plu. *hĭs-tĕr'ō-fīts* [Gr. *hŭstĕra*, the womb; *phuton, a plant*]: another name for the order Fungi; plants living upon dead or living organic matter, as the Fungi.

HYSTRICIDÆ, n. *hĭs-trĭs'ĭ-dē* [L. *hystrix;* Gr. *hustrix*, a hedgehog]: a family of Rodentia having the body covered by quills, or long spines mixed with bristly hairs; the typical genus of the family is *Hystrix:* see PORCUPINE.

HYSTRIX. See PORCUPINE.

HYTU'. See ITU.

HYVERNAT, *hē'vĕr-nat*, EUGENE XAVIER LOUIS HENRY, D.D.: American scholar; b. St. Julien-en-Jarrêt, Loire, France, 1858, June 30. He was graduated from the University of France at Lyons in 1876, studied divinity at the St. Sulpice Seminary, Issy, in 1877-9, at Paris in 1879-82, was Oriental interpreter to the Propaganda at Rome in 1885-9, and taught in the Roman Seminary in 1885-8. In 1889 he was appointed professor of Oriental languages and archæology in the Catholic University of America at Washington, D. C. His writings include: *Les Actes des Martyrs de l'Egypte* (Vol. I. 1886); *Album de Paléographie Copte* (1888); and *Du Caucase au Golfe Persique* (with Muller-Simonis 1892).

I

I, pron. *ī* [Ger. *ich;* Icel. *eg;* L. and Gr. *ĕgŏ,* I]: the person who is speaking; one's self.

I, or i, *ī:* ninth letter in the alphabets of w. Europe, third of the English vowels; called by the Greeks *Iota,* after its Shemitic name (Heb. *Yodh* or *Jod*), which signifies 'hand.' The oldest forms of the letter, denoting the palatal semi-vowel *y* (Heb. *Yodh*), as seen in the Phœnician and Samaritan, have a rude resemblance to a hand with three fingers, but by gradual simplification, the character came to be the smallest in the alphabet, and 'iota' or 'jot' is a synonym for a trifle. The original sound of the letter, and that which is considered its proper sound in all languages except English, is that given to Eng. *e* in *me;* with this power, it forms one of the fundamental vowels *i, a, u* (see A; also LETTERS AND ARTICULATE SOUNDS). What is called the long sound of *i* in Eng. is really the diphthong *ai* rapidly pronounced. For the power that the vowel *i,* followed by another vowel, has of turning the preceding consonant into a sibilant, see the letter C; further instances are seen in such French words as *rage, singe,* from Lat. *rabies, simia.* In Lat., there was but one character for the vowel *i* and the semi-vowel now denoted by the character *j;* and in English the two letters were formerly treated as the same letter, and appeared as such till recently in all English dictionaries. J. is now reckoned a consonant and treated as such. See J.

IABADIUS, *ī-a-bā'dĭ-ŭs:* immense fertile island of the E. Indies, rich in gold; mentioned by Ptolemy as near Malacca; prob. the island now called Java.

IAGO, n. *ē-â'gō* or *yâ'go:* in *Shakespeare,* an ensign of Othello the Moor, who, hating his master from jealousy and frustrated hopes of advancement, stimulated the Moor to such jealousy that he slew his bride Desdemona.

IAMBLICHUS, *ī-ăm'blĭ-kŭs* or *ē-ăm'blē-kŭs:* Syrian freedman, at the end of the reign of Trajan and beginning of that of M. Aurelius (117-169). He was instructed by a Babylonian in the language, manners, and literature of Babylon, and wrote the *Babylonica,* or Loves of Rhodanes and Sinonis, in 16 or 39 books, which has been preserved by Photius, c. xciv., and Leo Allatius. It is the oldest of the novels of antiquity which

has reached the present day, but has not merit of style or plot.

IAM'BLICHUS: philosopher, in the reign of Constantine, about 310: b. Chalcis, in Cœle-Syria, d. prob. before 333; of an illustrious and wealthy family. He was pupil of Anatolius and Porphyry; and he belonged to the Neo-Platonic school of Plotinus, whose doctrines he extended. Little is known of his life; but he was followed by a numerous school, who listened with enthusiasm and respect, and who thought that he was inspired, had intercourse with the gods, and could divine and perform miracles. This, with the learned philosophic haze which he threw around the popular superstitions, brought him immense veneration; though he himself did not claim miraculous power. His doctrines were a syncretic mixture of Pythagorean and Platonic ideas, mixed with superstition and magic, and the supposed manifestation of God by ectasies and a communication with the spiritual world by ceremonies. One of his great works, On the Choice of Pythagoras (*Peri Aireseos Pythagorou*), consisted of 10 books, of which there remained the 1st, A Life of Pythagoras, filled with prodigies, and evidently written against Christianity. 2d, An Exhortation to Philosophy (*Protreptikoi Logoi eis Philosophian*), an ill-arranged introduction to Plato. 3d, On the Common Knowledge of Mathematics (*Peri Koines Mathematikes Epistemes*), full of fragments of Pythagorus, Philolaus, and Archytus. 4th, On the Arithmetical Introduction of Nicomachus. The 5th and 6th books are lost. The 7th, The Theology of Arithmetic (*Ta Theologoumena tes Arithmetikes*); the 8th, the History of Music; the 9th, Geometry; the 10th, On the Study of Heavenly Bodies. He also wrote a work on the Soul, commentaries on Plato and Aristotle, another on the complete Chaldæan Philosophy, another on Beginnings, and one on Sacred Images, in which he affirmed that the gods resided in their statues. His celebrated work on the Mysteries (*Peri Musteriôn*) is disputed; it is drawn up as the answer of Abammon, a priest, to a letter addressed to his pupil, Anebo, by Porphyry. It contains many Egyptian doctrines, and esoterical explanations derived from the Hermetic Books, the writings of Bitys and others, mixed with Pythagorean and Neo-Platonic ideas. The style of Iamblichus is not careful, and is inferior to Porphyry. Iamblichus is supposed to have died at Alexandria. See Eudocia, *Violetum*, p. 244; Eunapius, *Vit. Philosoph.*, p. 20; Hebensbreit, *De Iamblicho* (Leip 1744); Brucker, *Hist. Crit. Phil.*, II. 260. *Iamblichus*, a Gale, fo. (Ox. 1678).

Several other writers of this name are known: e.g. IAMBLICHUS, younger philosopher of the Neo-Platonic school, b. at Apamea, supposed nephew of the preceding, praised by Libanius to Julian the Apostate.

IAMBUS, n. *ī-ăm'bŭs* [L. *ĭămbus;* Gr. *iambos*]: a

poetic foot of two syllables, the first short, the second long or accented: ADJ. pertaining to IAM'BICS, n. plu. *-bĭks,* a piece of poetry consisting of short and long syllables alternately. IAM'BICALLY, ad. *-kăl-lĭ.* IAMBIC VERSE, in classic prosody, and sometimes in English, poetry having the foot or metre called *Iambus.* Archilochus (q.v.) is the reputed inventor of iambic verse. The English language runs more easily and naturally in this metre than in any other. See METRE: VERSE.

'Thĕ stăg | ăt ēve | hăd drŭnk | hĭs fĭll.'
—*Lady of the Lake.*

IANTHE, n. *ī-ăn'thē:* in *myth.,* a girl of Crete who married Iphis; one of the Oceanides; one of the Nereides.

IAN'THINA. See JANTHINA.

IAPETUS, *ī-ăp'ĕ-tŭs:* in Greek and Roman *myth.,* the father of the human race; son of Cœlus and Terra (Heaven and Earth), and father of Atlas, Prometheus, and Epimetheus. Similarity of name has led some to deem him the same as Japheth, son of Noah, one of the three progenitors of the world's new population after the flood: this identification has no evidence. In *astron.* Iapetus is one of the satellites of Saturn.

IATRALIPTES, n. *ī-ā'tră-lĭp'tēz* [L. *ĭātralip'tēs,* an ointment doctor—from Gr. *ĭātrŏs,* a surgeon; *aleiptēs,* an anointer—from *aleiphō,* I anoint]: one who professed to cure diseases by anointing and friction. IA'TRALIP'TIC, a. *-lĭp'tĭk,* having the property of curing by anointing and rubbing.

IATRO-MATHEMATICIAN, n. *ī-ā'trō-măth'ĕ-mă-tĭsh'-ăn* [Gr. *ĭātrŏs,* a physician; and *mathematician*]: one of a school of physicians who explain the functions of the body and the action of remedies on mechanical principles.

IBARRA, *ē-bâr'râ,* or SAN MIGUEL DE IBARRA, *sân mĕ-ghĕl' dā ē-bâr'râ:* town of Ecuador, S. America, dept. of Quito, 60 m. n.e. of the town of Quito. It is on the n. base of the volcano of Imbabura, is well built, and has manufactures of wool and cotton. Pop. estimated about 10,000.

IBERIA, n. *ĭb-ē'rĭ-ă:* the ancient name for Spain; the country forming the basin of the *Ibe'rus,* or *E'bro.* See HISPANIA: GEORGIA. IBERIAN, n. one of the original inhabitants of Spain.

IBE'RIS. See CANDYTUFT.

IBERVILLE, *ē-bĕr-vēl',* PIERRE LE MOYNE, Sieur d': 1661, July 16—1706, July 9; b. Montreal: founder of Louisiana. He entered the French navy when 14 years old, served in De Troye's overland expedition from Canada against the English forts on Hudson's Bay, captured several English vessels and reduced Fort Quitchitchonen 1688-9, was a leader in the Schenectady expedition 1690, given command of a frigate 1692, captured Fort Nelson

REPRESENTATIVE IBISES.

1. Open-bill (*Anastomus lamelligerus*). 2. Wood Ibis (*Tantalus Ibis*).
3. Sacred Ibis (*Ibis religiosa*).

on Hudson Bay 1694, reduced Fort Bourbon 1697, sailed into Mobile Bay with 200 settlers 1699, Jan. 31, discovered Pascagoula river, and built Fort Biloxi 1699, ascended the Mississippi river 1700, revisited La. 1701, colonized Ala., was promoted capt. of a line of battleship 1702, captured the island of Nevis 1706, and died suddenly in Havana.

IBEX, n. *ī'bĕks* [L. *ibex*, the ibex]: wild goat of the mountains: ancient Bouquetin (q.v.), or Steinbock of the Alps; and now, according to some zoologists, a genus of the goat family, or sub-genus of goat, having the horns flat, and marked with prominent transverse knots in front, whereas those of the true goats are compressed and keeled in front, and rounded behind. The species all inhabit high mountainous regions of Europe, Asia, and Africa. The Ibex of the Caucasus and the Ibex of the Pyrenees differ a little from the Ibex of the Alps, and from one another, but the differences may perhaps be regarded as those of varieties rather than of species.

The conventional Ibex in Heraldry resembles the heraldic antelope in all respects, except that the horns are straight and serrated.

IBICUI, or Ibicuy, *ē-bē-kwē'*: important affluent of the Uruguay river (q.v.).

IBIDEM, ad. *ĭb-ī'dĕm*: with its contr. Ibid., *ĭb'ĭd* [L. *ĭbīdĕm*]: in the same place.

IBIS, *ī'bĭs* [Gr. and L.]: genus of birds of the family *Ardeidæ*, or, according to some ornithologists, of *Scolopacidæ*, and perhaps to be regarded as a connecting link between them. The bill is long, slender, curved, thick at the base, the point rather obtuse, the upper mandible deeply grooved throughout its length. The face, and generally the greater part of the head, and sometimes even the neck, are destitute of feathers, at least in adult birds. The neck is long. The legs are rather long, naked above the tarsal joint, with three partially united toes in front, and one behind; the wings are moderately long; the tail is very short. The Sacred Ibis or Egyptian Ibis (*I. religiosa*) is an African bird, two feet six inches in length, though the body is little larger than that of a common fowl.—The Glossy Ibis (*I. falcinellus*) is a smaller species, also African, but migrating northward into continental Europe, and occasionally seen in Britain. It is also a N. American bird. Its habits resemble those of the sacred ibis. Its color is black, varied with reddish brown, and exhibiting fine purple and green reflections. It has no loose pendent feathers. The White Ibis (*I. alba*), a species with pure white plumage, abounds on the coast of Florida. Audubon saw multitudes on a low islet, and counted 47 nests on a single tree. The Scarlet Ibis (*I. ruber*) is a tropical American species, remarkable for brilliant plumage, which is scarlet, with a few patches of glossy black. The Straw-necked Ibis (*I.* or *Geronticus spinicollis*) is a large Australian bird of fine

plumage, remarkable for stiff naked yellow feather-shafts on the neck and throat.

The SACRED IBIS, one of the birds worshipped by the ancient Egyptians, and called by them *Hab* or *Hib*, and by the modern Egyptians *Abu-Hannes* (i.e., Father John), is a bird with long beak and legs, and a heart-shaped body, with black and white plumage. It was supposed, from the color of its feathers, to symbolize the light and shade of the moon, its body to represent the heart; its legs described a triangle, and with its beak it performed a medical operation; from all of which esoterical ideas it was the avatar of the god Thoth or Hermes (see HERMES), who escaped in that shape the pursuit of Typhon, as the hawk was the avatar of Ra, or Horus, the sun. The feathers of the Ibis were supposed to scare, and even kill, the crocodile. It appeared in Egypt at the rise, and disappeared at the inundation of the Nile, and was thought, at that time, to deliver Egypt from the winged and other serpents which came from Arabia in certain narrow passes. As it did not make its nest in Egypt, it was thought to be self-engendering, and to lay eggs for a lunar month. According to some the basilisk was engendered by it. It was celebrated for its purity, and drank only from the purest water, and the most strict of the priesthood drank only of the pools where it had been seen; besides which, it was fabled to entertain the most invincible love of Egypt, and to die of self-starvation if transported elsewhere. Its flesh was thought to be incorruptible after death, and to kill it was punishable with death. Ibises were kept in the temples, and unmolested in the neighborhood of cities. After death they were mummied, and there is no animal of which so many remains have been found at Thebes, Memphis, Hermopolis Magna, or Eshmun, and at Ibiu or Ibeum, 14 m. n. of Eshmun. They are made up into a conical shape, the wings flat, the legs bent back to the breast, the head placed on the left side, and the beak under the tail. They were prepared as other mummies, and wrapped up in linen bandages, which are sometimes plaited in patterns externally. At Thebes, they are found in linen bandages only: at Hermopolis, well preserved in wooden or stone boxes of oblong form, sometimes in form of the bird itself, or the god Thoth; at Memphis, in conical sugar-loaf-shaped red earthenware jars, the tail downward, the cover of convex form, cemented by lime. There appear to be two sorts of embalmed ibises—a smaller one of the size of a corncrake, very black, and the other black and white—the *Ibis Numenius* or *Ibis religiosa*. This last is usually found with its eggs, and with its insect food, the *Pimelia pilosa*, *Akis reflexa*, and portions of snakes, in the stomach. It is said to resemble the Ibis of India rather than that of Africa. By the Jews, it was held to be an unclean bird.—Wilkinson, *Manners and Customs*, v. 7, 217; Passoloegua, *Catalogue Raisonné*, p. 255, Pettigrew, *History of Mummies*, p. 205; *Horapollo*, i. c. 30, 36.

IBN EZ'RA. See ABEN-ESRA.

IBN SI'NA. See AVICENNA.

IBRAHIM PASHA, *ĭb-râ-hēm' pâ-shâ'*, **Viceroy of** Egypt: 1789-1848, Nov. 9 (ruled 1844-48); b. Cavalla, Roumania; real or adopted son of Mohammed Ali, whom he succeeded as viceroy. He gave the first proofs of his gallantry and generalship 1819, in quelling the insurrection of the Wahabis. He afterward subdued Sennaar and Darfur. He invaded the Morea at the head of an Egyptian army 1825, with the view of reducing it under the power of Mohammed Ali; but the intervention of the great powers in the affairs of Greece compelled him to abandon this enterprise 1828. Mohammed Ali having conceived the design of adding Syria to his dominions, Ibrahim crossed the Egyptian border with an army, 1831, Oct., took Acre by storm, and quickly made himself master of the whole of Syria. A peace was concluded 1833, May 4, the Turks not only giving up Syria, but also transferring Adana to Ibrahim personally, on a kind of lease. When war broke out again between Mohammed Ali and the sultan, 1839, Ibrahim was again successful, totally routing the Turks in the great battle of Nisib, June 24. The interference of the great powers eventually compelled him to relinquish all his Syrian conquests, and to return to Egypt. During his passage through the desert, he suffered terrible hardships and losses, and the attempt to elevate Egypt to independence came to an end. In 1844, this great commander was called to be viceroy; and in 1848, when his aged father had sunk into absolute dotage, Ibrahim went to Constantinople, and was installed by the Porte as Viceroy of Egypt; but in a few months he died at Cairo. He was succeeded, not by any of his own children, but by Abbas Pasha, favorite grandson of Mohammed Ali.

IBRAIL', or IBRAI'LA, or BRAI'LA, or BRAILOW'. See BRAHILOV.

IBSEN, HENRIK, *hĕn'rĭk ĭb'sĕn:* Norwegian novelist and dramatist: b. Skien, Norway, 1828, March 20, d. 1906, May 22, of mixed Scottish and German descent. At 16 he became apprentice to an apothecary at Grimstad, a small village on the s.e. coast of Norway, and here were composed his first works, *Hösten*, a poem, and *Catilina*, a play published in 1850 over the signature of Brynjolf Bjanne. After a few months at the University of Christiania in 1850, where he wrote *The Warrior's Mound*, played at the Christiania Theatre that year, he became manager of the new National Theatre at Bergen and turned his attention directly to dramatic composition. In 1856 his *Banquet at Solhaug*, a Norwegian historical drama, was produced here, and from 1857 to 1862 he was manager of the Norwegian Theatre at Christiania. To this period belong his historical plays, *Lady Inger of Östraat* (1857); and *The Vikings at Helgeland* (1858); *The Comedy of Love* (1862), and several poems. His greatest historical drama, *The Pretenders*, appeared in

1864, and, indignant at the political position of Norway at the time, Ibsen then left Norway to be absent (save for short visits) for, as it proved, 27 years, living for a time in Germany and then in Trieste and Rome. His noble dramatic poem, *Brand,* was first published in 1866, and the Storthing thereupon voted him the 'poet's salary.' In 1867 appeared the famous dramatic poem, *Peer Gynt,* followed by a political comedy, *The League of Youth* (1869); and the play, *Emperor and Galilean,* his longest work (1873). In 1864 he returned to Norway for a short visit and was everywhere enthusiastically welcomed. His subsequent works include the social dramas which are the basis of his fame: *The Pillars of Society* (1877); *A Doll's House* (1879); *Ghosts* (1881); *An Enemy of the People* (1882); *The Wild Duck* (1884); *Rosmersholm* (1866); *The Lady From the Sea* (1888); *Hedda Gabler* (1890); *Master Builder Solness* (1892); *Little Eyolf* (1894); *John Gabriel Borkman* (1896); *When We Dead Awaken* (1900); *Digte* (poems) appeared in 1871. By Ibsen's countrymen the poems *Brand* and *Peer Gynt* are considered his greatest works, both being intensely national, but nevertheless of universal application. Brand, the hero of the first, represents a protest against compromise, while *Peer Gynt,* sometimes styled 'the Scandinavian Faust,' is an analysis of the human soul. The modern life dramas are the works by which Ibsen is best known to the world at large. The setting only is Norwegian, the lesson they convey is of world-wide extension. *The Pillars of Society* is an attack upon hypocrisy as exemplified in the principal personages in a small town, while *A Doll's House,* which has had a wide popularity in America, is concerned with the failure of marriage. *Ghosts* is perhaps the most impressive and awesome of all of Ibsen's works, its theme being the consequences of hereditary vices. *The Wild Duck* and *Rosmersholm* are gloomy, despairing dramas; *Hedda Gabler* presents in the character of Hedda a woman of the undomestic, selfish type, while the fearful price of success forms the motive of *Master Builder Solness.* The theme of *A Doll's House* is in effect that of *Little Eyolf,* but in the latter, Ibsen, who has hitherto seemed pessimistically to foretell the dissolution of modern society, now admits a hope of its regeneration. Over Ibsen's works a vast amount of controversy has arisen, and he has been fiercely assailed as cynical and even immoral, and as zealously defended. The truth of the matter appears to be that he is *par excellence,* the poet of protest against social sophistry, and that he unerringly indicates the danger spots in modern life. There is nothing conventional in the construction or motive of his plays. More than once the climax of the play is represented as occurring prior to the opening of the drama, which is concerned only with the consequences. Ibsen has made a deep impression upon the literature of his century,

1. Iceberg off Silt Cave, St. Johns, Newfoundland, appearing like a yacht under full sail.
2. Iceberg composed partly of soft ice, which rapidly melts on its journey southward.

and his fame is not likely to decrease. Consult: Brandes, *Henrik Ibsen*, in *Eminent Authors of the 19th Century* (1866); Jaeger, *Henrik Ibsen: a Critical Biography* (1890); Wicksteed, *Four Lectures on Henrik Ibsen* (1892); Shaw, *The Quintessence of Ibsenism* (1893); Boyesen, *A Commentary on the Writings of Henrik Ibsen* (1894).

ICACINA, n. *ī-kăs-ī'na* [Sp. *icaco, Chrysobalanus icaca*, which Icacina resembles]: typical genus of the order *Icacinaceæ*, a tribe of *Olacaceæ* sometimes elevated into a distinct order; found in the E. Indies, Africa, and S. America.

ICARIAN, a. *ī-kā'rĭ-ăn* [Gr. *Ikăriŏs;* L. *Icăriŭs*, of or pertaining to *Icărus*, the son of Dædalus, who, attempting to fly with artificial wings too near the sun, the wax that cemented them was melted, and he fell into the sea]: adventurous; soaring too high for safety. See DÆDALUS.

ICE, n. *īs* [Icel. *is;* Ger. *eis;* Dut. *ijs*, ice]: frozen water; water in a solid state; a sweetmeat congealed by ice or a freezing mixture: V. to chill; to cover with ice; to cover with a concretion of sugar. IC'ING, imp.: N. the act of covering with ice; the giving the appearance of ice to anything; the fine preparation of white sugar employed to adorn cakes, etc. ICED, pp. *īst:* ADJ. chilled with ice; frosted with sugar. ICICLE, n. *īs'ĭ-kl* [AS. *ises gicel;* Low Ger. *ishekel;* Dut. *ijs-kegel*, an icicle—the latter element being the Icel. *jökull*, a mass of ice]: a pendant or conical mass of ice hanging from the eaves of a house, etc. ICY, a. *īs'ĭ*, full of ice; consisting of ice; having the nature of ice; very cold; frigid; without affection. IC'INESS, n. *-ĭ-nĕs*, state of being very cold. TO BREAK THE ICE, to begin a subject or topic; to remove the first obstructions or difficulties. ICE'BERG, n. *-bĕrg* [Ger. *eis*, ice: Sw. or Ger. *berg, a mountain*]: mountainous mass of ice floating in the sea; such masses when flat are called *field-ice*, when smaller, *floes* (see ICE). ICE-BLINK [Dan. *iis-blink;* Sw. *isblink*]: a distant bright appearance arising from the reflection of light from ice, seen before the ice itself; a field of ice extending far into the interior of Greenland, so named from its shining appearance. ICE-BOUND, totally surrounded with ice, so as to hinder access or advance. ICE-CREAM, cream flavored and congealed, corrupted from ICED-CREAM. ICE-FIELD, a very great extent of ice in the arctic seas. ICE-FLOE, a mass of floating ice. ICE-HOUSE, a place for storing and preserving ice for use. ICE-PACK, broken and drifting ice again united into an irregular mass. ICE-PLOW, a plow for making grooves on ice and breaking it up. ICE-SPAR, a transparent variety of orthoclase or common prismatic feldspar. ICE-FOOT, n. *-fŭt*, the narrow fringe of ice which forms every winter along boreal shores, rising to a height of 20 or 30 feet above sea-level,

and stretching in breadth from 120 to 130 feet. ICE-BROOK TEMPER, in *Spain*, the temper given to a sword by plunging it when it is hot into icy-cold water.

ICE: water in the solid crystalline form. It is specifically lighter than water which is just about to freeze, and therefore floats in it. Water, in becoming solid, expands about $\frac{1}{9}$ of its volume or bulk. The formation of ice takes place generally at the surface of water. This is owing to the peculiarity that when water has cooled down to within 7°.4 of freezing, it ceases to contract, as before, with increase of cold, and begins to expand until it freezes; which causes the coldest portions of the water to be always floating on the surface. In some circumstances, however, not fully explained, ice forms at the bottom of rivers, and is called ground-ice.

Water in ordinary cases freezes at the degree of heat marked 32° on Fahrenheit's thermometer, and 0° on the Centigrade and Reaumur's; but if kept perfectly still, it may be cooled to nearly 22° F. below freezing, and still remain liquid. The least shake, however, or the throwing in a solid body, makes a portion of it freeze instantly, and its temperature rises immediately to 32°. Sea-water, and salt water in general, freezes at a lower temperature than pure water; in doing which, part of the salt separates, and the ice, when melted, gives water that is fresher than the original. The color of pure ice is deep blue, discernible, however, only when it is in large masses: it is best seen in the clefts of a glacier or an iceberg.

In the neighborhood of the poles, and on mountains of a certain height in all latitudes, there are immense masses of permanent ice; and even in some districts of Siberia, where a kind of culture is practicable in summer, there are found at a certain depth below the surface of the earth strata of ice mingled with sand. In sinking a well at Yakutsk, the soil was found frozen hard to the depth of 382 ft., and consisting in some parts entirely of ice. These permanent masses of ice must be classed with rocks and mountains, as among the solid constituents of the globe. In the lower regions of the torrid zone there is no ice, and in the temperate zones it is a passing phenomenon. From the polar ice-fields and glaciers which are always protruding themselves into the sea, great floating masses become detached, and form *icebergs*, floes, and drift-ice. These bergs or mountains of ice are sometimes more than 250 ft. above sea-level. They present the appearance of dazzling white chalk-cliffs of most fantastic shapes. Fresh fractures have a green or blue color. From the specific gravity, it is calculated that the volume of an iceberg below the water is eight times that of the protruding part. Icebergs, and floes or ice-fields, are often laden with pieces of rock and masses of stones and detritus, which they have brought with them from the coasts where they were formed, and

which they sometimes transport far toward the equator. These floating mountainous islands of ice are dangerous to navigation.

The hardness and strength of ice increase with the degree of cold. In the severe winter of 1740, a house was built of the ice of the Neva at St. Petersburg 50 ft. long, 16 wide, and 20 high, and the walls supported the roof, also of ice, without the least injury. Before it stood two ice-mortars and six ice-cannon, made on the turning-lathe, with carriages and wheels also of ice. The cannon were of the calibre of 6-pounders, but they were loaded with only ¼ lb. of powder, and with hemp-balls—on one occasion with iron. The thickness of the ice was only four inches, and yet it resisted the explosion. In recent years, ice-structures in the semblance of palaces, of great size and beautiful with a variety of color, have been reared in several places, notably in Montreal.

About 24 years ago, Faraday called attention to a remarkable property of ice, since (incorrectly) called Regelation. He endeavored to account for the fact, that two slabs of ice, with flat surfaces, placed in contact, unite into one mass when the temperature of the surrounding air is considerably *above* the freezing-point, by assuming that a small quantity of water, surrounded on every side by ice, has a natural tendency to become ice; and the fact, that two blocks of ice placed in contact do not unite unless they are *moist*, seems to bear out this idea. But J. Thomson gave a totally different explanation of this phenomenon. He showed that the capillary force of the film of water between the plates is sufficient to account for a very considerable pressure between them; so that from his point of view the phenomenon would be identical with the making of snowballs by pressure; and with the formation, by a hydraulic press, of clear blocks from a mass of pounded ice, an observed fact, the explanation of which is to be found in the property of ice mentioned below. See *Proceedings of the Royal Soc.*, 1860-1. Faraday, taking up the question again, showed that the (so-called) regelation takes place in *water* as readily as in air, a fact quite inconsistent with the action of capillary forces. To this, J. Thomson replied, showing, very ingeniously, that the capillary forces that he at first assumed are not necessary to a complete explanation of the observed phenomena. (See reference above.)

Other views of the question are numerous, e.g., that of Persoz, adopted by Forbes, in which ice is considered as essentially colder than water, and as passing through a sort of viscous state before liquefying, as metals do during the process of melting. This idea, however, has not of late found much support; and it is probable that the true solution of the question is, as J. Thomson has lately pointed out, to be found in the analogy of the crystallization of salts from their aqueous solutions.

However that may be, there is no doubt about the following property of ice, theoretically predicted by J. Thomson from the experimental fact of its expanding in the act of freezing, and demonstrated by means of the Piezometer by Sir W. Thomson—viz., that the freezing-point of water, of the melting-point of ice, is *lowered by pressure;* and the brothers have, with singular ingenuity, applied this to the explanation of the motion of glaciers. That a mass of glacier-ice moves in its channel like a viscous fluid, was first completely established by Forbes. Thomson's explanation of this motion is of the following purport: In the immense mass of the glacier (even if it were homogeneous, much more so when full of cracks and fissures, as it always is), there are portions subjected to much greater strain than others. The pressure to which they are subjected is such as corresponds to a melting-point considerably *below* the temperature of the mass—therefore, at such points, the ice melts, the strain is relieved, and the whole mass is free for an instant to move nearly as a fluid would move in its place. But, the strains being thus for an instant removed, the temperature and pressure of the water are again consistent with freezing—the thin layer of water quickly solidifies, and then matters proceed as before. Thus, at every instant, the strains at different parts of the mass melt it at those places where they are greatest, and so produce the extraordinary phenomenon of a mass which may in common language be termed *solid,* and even *rigid,* slowly creeping down its rocky bed like a stream of tar or treacle.

Ice-Trade and Manufacture—The trade in ice is of great and increasing importance. Ice has always been esteemed a luxury in warm weather; and this early led to the storing of it in winter for summer use. The Greeks, and afterward the Romans, at first preserved snow, closely packed in deep underground cellars. Nero, at a later period, established ice-houses in Rome, similar to those now in use in most European countries. But these means were not enough to supply the luxurious Romans with ice for cooling beverages, and they actually established a trade in snow, which was brought to Rome from the summits of distant mountains.

The trade in ice in Britain has, until lately, been very limited, having been confined chiefly to the supply required by a few of the first-class fishmongers and confectioners—the private residences of opulent families being furnished with ice-houses in which a sufficiency is stored for private use. But the N. Americans have started a trade in this article in their own cities, which has extended to Europe and Asia, and has, in very short time, attained surprising magnitude. The export of ice from America was commenced about 1820, by a merchant named Tudor, who sent ice from Boston to the W. Indies. Persevering against many losses, he established a trade

with Calcutta, Madras, and Bombay; and now not only is ice sent in vast quantities to those places, but also to Hong-kong, Whampoa, and Batavia. About 1840, the Wenham Lake (Mass.) Ice Company commenced sending ice to England from Boston, which is the great American port for this shipment; and since then there has been increasing demand, which has brought other companies into the business.

In America the ice is collected chiefly in the neighborhood of Boston, New York, Philadelphia, and other large cities; and the lakes which supply it form no small part of the property of those whose lands border thereon; these lakes have all been carefully marked out, and the right secured, so that, when the winter comes, and the ice is formed, the harvest begins with great regularity. The Hudson river in its upper course yields a very large supply. The ice is cleared from snow by means of an implement called the plane. An ice-plow, drawn by horses, and driven by a man riding upon it, is then made to cut parallel grooves about three inches deep in the ice, and these are again crossed by other grooves at right angles, so that the whole of the surface is deeply marked out into small squares, measuring a little more than 3 ft. After a few of these square blocks have been detached by hand-saws, the remainder are easily broken off with crowbars, and floated away to the ice-storehouses, usually built of wood, on the borders of the lake. Some of these are of vast dimensions, and contain vaults of great depth; the walls are double, and sometimes treble, being altogether as much as 4 ft. in thickness, and having hollow spaces between to render them less heat-conducting. The blocks of ice are covered over with sawdust, a layer being placed between each tier of blocks. Many of these ice-houses are large enough to hold 40,000 to 50,000 tons of ice. When fully stored, a large quantity of dried marsh-grass is trodden in upon the top, to the thickness of several feet, and the doors are then securely closed. The yearly consumption of ice by New York city alone amounts to 500,000 tons. The total value of the ice annually stored in America has been computed at $4,500,000, and if to this we add the ice-trade of Norway, Sweden, Russia, which, from the slight data we possess, is estimated at $3,000,000, we have the remarkable fact, that a value of seven and a half millions of dollars is added to a comparatively small body of water by the mere act of freezing. The moving of this enormous quantity of ice necessitates the maintenance of a large fleet of barges and other boats for the domestic trade, and of sailing vessels for the export trade, and to the cost of maintaining these vessels, when figuring the cost of harvesting, must be added the cost of towing, loading, discharging, dock and stable rent, repairs of boats, ice-houses, and wagons, etc., all this before the ice is placed in the hands of the retailer.

Notwithstanding the facilities for importing ice, there is, and always will be, a necessity for procuring it locally if possible. Hence much invention has been given to devising means for artificial freezing (see FREEZING MIXTURES). But until recently, the modes of producing ice artificially were too costly to be practically useful. The desideratum, however, is now supplied by machines capable of producing ten tons of ice daily. See REFRIGERATING MACHINES.

ICE-BREAKER: a vessel, especially a strong, heavy steamer, with powerful engines, for opening up navigable channels in frozen waters. On the Great Lakes of the United States, where such vessels are extensively used, they are generally fitted for carrying cargoes or transporting railroad cars. Such vessels are usually so built as to run their bows up on the ice and break it by means of their great weight. An ice-breaker called the 'Yermak,' built in England in 1899, for use in Russian waters, is 305 ft. long, with 71-ft. beam and draft of 25 ft. She did good harbor work in polar ice in 1900, but proved unequal to the heavy pack of the sea. Admiral Marakoff of the Russian navy, who superintended her trials, believes that the best way to reach the north pole is by means of a powerful ice-breaker, using liquid fuel instead of coal.

ICE'LAND: large island in the northernmost part of the Atlantic, on the confines of the Arctic Ocean; n. lat. 63° 23′—66° 33′, and w. long. 13° 22′—24° 35′; about 600 m. from Norway, 250 from Greenland, 250 from the Faröe Isles, and more than 500 from the north of Scotland. It belongs to the kingdom of Denmark. Its extreme length e. to w. is more than 300 m., greatest breadth n. to s. about 200; area 39,207 sq. m. Its coasts, particularly on the n. and w., are much broken by bays or *fiords*. In some of the bays are numerous small islands. Iceland is in many respects one of the most interesting parts of the world. Its physical features are very remarkable, and not less so its history and the character of its inhabitants. It consists in great part of lofty mountains, many of which are active volcanoes; only certain level districts along the coast, and a few dales, are habitable, or in any degree capable of cultivation, while even there scarcely a tree is to be seen, and the climate is unsuitable for grain. The interior of the island is occupied almost entirely with rugged tracts of naked lava and other volcanic products, vast ice-fields in many places connecting its high mountain summits, among which are prodigious glaciers, in some instances descending even to the coast, they and the torrents which gush from them rendering communication between one inhabited spot and another very difficult and dangerous. Yet here has civilization been long established, and the people, necessarily very poor, have cultivated poetry and other departments of literature with great success.

The highest mountain in the island is Oeräfa Jökul, 6,426 ft. above sea-level. It is in the s.e., and is connected with a vast mountain mass, of which several of the summits are actively volcanic, no less than 3,000 sq. m. being perpetually covered with ice and snow at an elevation varying from 3,000 to above 6,000 ft., while all underneath seems full of either active or smoldering volcanic fire. The most celebrated volcano is Hecla (q.v.). Krafla is perhaps the most noted of a great group of active volcanoes in the n. of the island. The eruptions of Hecla have caused no little devastation, but still more terrible and destructive have been those of Skaptár Jökul and other volcanoes of the same mountain mass, which burst forth for the first time within the historic period, 1362. In repeated instances volcanic islets have been thrown up in the bays near the coasts of Iceland, which have generally disappeared within a short time. Connected with the volcanic fires are hot springs in great number, some of which flow gently, and others, called *Geysers* (q.v.), gush up at intervals with ebullitions of great violence. Numerous hot springs may in many places be seen sending up their steam in a single little valley, and the Icelanders are accustomed to avail themselves of them for the washing of clothes and other purposes. The water of some springs is lukewarm, while that of others is boiling; some are pure, and some sulphureous. They are subject to great variations, and appear and dry up very suddenly. Earthquakes are frequent, and the island suffered very severely from this cause 1755 and 83. The winter is not generally more severe than that of Denmark, though more protracted; and it is rather the shortness of the summer and the insufficiency of summer heat, with the superabundance of moisture, than the severity of the winter, which is unfavorable to the growth of corn and plants of many other kinds. In the s. portions of Iceland, the longest day lasts 20 hours; the shortest, 4 hours. In the n. districts, the sun does not set for a whole week in midsummer, and for a week in midwinter does not rise above the horizon.

About 20,000 oxen, 40,000 horses, and 750,000 sheep constitute the chief wealth of the inhabitants. The horses are small, but vigorous and active. They receive little attention from their owners, whose oxen require almost all the hay and other fodder that they can store up for the winter. Iceland ponies have now begun to be imported into Britain. Reindeer were introduced into Iceland by a public-spirited governor 1770, and have become naturalized in the uninhabited tracts of the interior, where, however, their presence is of little importance. Seals abound on the coasts, where sea-fowls also are extremely numerous, and their flesh, eggs, and feathers are much sought after. Swans, and other *Anatidæ*, frequent the lakes. The Eider Duck is plentiful on many

parts of the coast, and its down is a principal article of commerce. Fish of many kinds are abundant on the coasts, salmon and trout in the rivers. The food of the people consists in great part of fish. The cod-fishery is extensively prosecuted by the French, two to three hundred French vessels and about 7,000 seamen being employed in it, under the immediate patronage of the French govt., which aims at thus training seamen for the navy. The salmon-fishery of some of the rivers has begun to be prosecuted for the supply of the London market. The herring-fishery has not hitherto received special attention, but vast shoals of herrings frequent the fiords. The most important agricultural operations are those of the hay-harvest. The seeds of the *Melur,* or Upright Sea Lyme Grass (*Elymus arenarius*), are gathered and used for making pottage and cakes, and are much relished; bread made of imported grain being rather a luxury in the houses of the common people. Meal made of Iceland Moss (q.v.) is used in a variety of ways, and this lichen is gathered in large quantities for home use and for exportation. Potatoes, turnips, kale and cabbage, spinage, parsley, radishes, mustard, cresses, etc., are produced in gardens. The mineral wealth of Iceland has only begun to be developed. In no part of the world is sulphur found in such abundance. Iron ore also is found. There is a peculiar kind of brown coal called *Surtarbrand* (q.v.), which, with drift-wood, is used for fuel on the n. and e. coasts.

It is supposed that the population of Iceland was once 100,000, but it subsequently diminished. Since 1840, when it amounted to 57,094, a gradual increase has taken place, until in 1903 it had reached 78,470. The people, who are of Scandinavian origin, are distinguished for honesty, purity of morals, and wonderful love of education. Notwithstanding their poverty and other adverse circumstances, it is rare to find an Icelander who cannot read and write. They belong to the Prot. Church. The clergy are, like their parishioners, very poor; they are under one bishop. The Icelanders are strongly attached to their native country, and delight in the study of its history as set forth in ancient *sagas* and poems. Their language is the old Norwegian, preserved in almost its pristine purity (see SCANDINAVIAN LANGUAGES AND LITERATURE). They are rather a small race, and seldom attain a great age. Scurvy was a very common disease, and cases of elephantiasis were frequent, probably due largely to the nature of their food, and to their miserably crowded and unventilated dwellings, which are mostly cottages of the humblest description, built of turf or of pieces of lava, the crevices stuffed with moss, and the roof formed of turf. Scurvy has now entirely disappeared, and elephantiasis is becoming very rare. The knitting of stockings and gloves is a common domestic industry; and with the sale of skins, wool, feathers,

eider-down, fish-oil, etc., enables the peasantry to procure a few articles of foreign produce. The chief imports are rye, barley, flour, coffee, liquors, tobacco, sugar, coal, iron, etc. In 1905 the value of the imports was 4,332,000 kroner; of exports, 3,848,000 kroner. The annual exports are valued at about $2,000,000, and consist of dried fish, wool, hosiery, tallow, train-oil, lard, salt meat, feathers, skins and horses. The destruction of meadows by volcanic eruptions, and the interruption of fishing by drift-ice, have sometimes caused great distress. Since 1855 free-trade has been in force; 32 authorized trading-places have been opened, of which Reykiavik (pop. 2,024), at the head of a bay in the s.w. of the island, is the most important. Here is the seat of the government; here are a college, medical and theological schools, a public library of 10,000 vol., a Royal Icelandic Soc., and an observatory; and newspapers and Icelandic books are printed. There is regular steam-communication during summer with Leith and Copenhagen.

The authentic history of Iceland begins with the latter half of the 9th c., when emigrants from Norway settled here. The Landnama Book, however, one of the earliest records of the island, states that the Christian relics found here by the Norwegians on their arrival—as wooden crosses, etc.—had been erected previously by Irish settlers. However this may be, it is certain that the first authentic successful settlement of Iceland was made under Ingolf, a Norwegian, who, after a fruitless attempt on the s. coast 870, succeeded in establishing himself at Reykiavik 874. The changes introduced in Norway by Harald Haarfager caused many who could not endure them to betake themselves to other countries, and particularly to Iceland, all the habitable coast districts of which were occupied within 60 years, and the old Norwegian institutions were transferred to it unmodified. The government was at first, in the times of paganism, hierachic and aristocratic; it became afterward a kind of aristocratic republic. The Althing met every summer in the valley of Thingvalla. Christianity was not established by law till A.D. 1000, and then not without much opposition. Schools were then founded, and two bishoprics in Holar and Skalholt.

The Icelanders were enterprising sailors in the early periods of their history, and discovered Greenland about 982, and a part of the American coast, which they called *Vineland*, about 990. They made voyages also to the south, visiting the farthest parts of the Mediterranean. The most flourishing period of Icelandic literature and commerce was from the middle of the 12th to the beginning of the 13th c., when, in consequence of domestic broils, Haco V. of Norway succeeded in reducing the whole island under his sway (1262), and a declension began, which continued till a new impulse was given to the minds of men, here as elsewhere, by the Reforma-

tion. When Norway was united to Denmark 1380, Iceland shared its fate, but was not transferred with Norway to a new allegiance in 1814. The Prot. religion was introduced 1540, but not fully established till 1551. In the 17th c., the island suffered much from the ravages of Algerine pirates, who carried away many persons to slavery. In 1707, small-pox carried off 18,000 persons; and 1784-5, about 9,000 died of famine.—The Althing, after it had subsisted for fully 900 years, was suppressed in the 19th c., but was reorganized 1843. By the new constitution for Iceland 1874, Jan., the Althing has obtained legislative powers in all matters concerning Iceland. It consists of 40 members, 34 elected by popular suffrage, 6 nominated by the King of Denmark. A Minister for Iceland nominated by the king is the head of the administration, the office of governor having been abolished in 1903.—See Von Troil, *Letters on Iceland*, 1772; Sir George Mackenzie, *Travels in Iceland*, 1810; Henderson, *Journal of a Residence in Iceland*, 1818; C. S. Forbes, *Iceland, Its Volcanoes, Geysers, and Glaciers*, 1860; S. Baring-Gould, *Iceland, Its Scenes and Sagas*, 1863; Capt. Richard F. Burton, *Ultima Thule: a Summer in Iceland*, 1875.

ICELANDER, n. *īs'lănd-ėr:* a native of Iceland. ICELAND'IC, a. *-lănd'ĭk*, of or belonging to: N. the language of the Icelanders; the old Norse language.

ICE'LAND MOSS (*Cetraria Islandica*): lichen found in all the northern parts of the world, and valuable for nutritious and medicinal properties. It is collected as an article of commerce in Norway and Iceland. In far northern regions, it grows even near the level of the sea; in more southern countries, it is found on mountains. It is common in the mountainous parts of Britain, though not turned to any economic account. In Carniola, it is used for fattening cattle and pigs. It grows in extreme abundance in Iceland on tracts otherwise desert; and numerous parties migrate from great distances with horses, tents, and provisions, in the summer months, for the sole purpose of gathering it, as an article of commerce and for food. In many places, this lichen thickly covers the whole surface of the ground, growing about 1½-4 inches high; and consisting of an almost erect *Thallus* (q.v.). It is of a leathery and somewhat cartilaginous substance. When Iceland moss is used as an article of food, its bitterness is first partially removed by steeping in water, after which, in Iceland and other northern countries, it is sometimes pounded and made into bread; or it is prepared by boiling, the first water being rejected. It is often boiled with milk, making a kind of jelly, either with milk or water. It is a nutritious food, and suitable for invalids, but is not in great request except in times of scarcity. It contains about 80 per cent. of a kind of starch called *Lichen Starch*, or *Lichenin*, and owes its bitterness to an acid principle,

Cetraric Acid.—An allied species, *Cetraria nivalis*, growing in northern countries, possesses similar properties. It is very abundant in some parts of Iceland, where it is called *Mary's Grass*, and is used, though not habitually, for food.

ICELAND-SPAR: variety of calcareous spar, remarkable for its transparency and double refraction: the best specimens are obtained from Iceland.

ICE PLANT (*Mesembryanthemum* [q.v.] *crystallinum*): annual herbaceous plant, native of Africa and s. Europe, remarkable for the watery vesicles (*papulæ*) with which its whole surface is covered, which have the appearance of granules of ice, and sparkle in the same manner in the sun. This interesting peculiarity makes it common as a tender annual in greenhouses. The seeds are used for food in the Madeira Islands. The ashes supply barilla, and the plant is burned on this account in countries where it abounds.

ICHNEUMON, n. *ĭk-nū'mŏn* [L. and Gr.—from Gr. *ichneuō*, I follow the steps]: a sort of ferret or civet inhabiting Egypt, which tracks or hunts after the eggs of the crocodile, and feeds on them. See ICHNEUMON (*Herpestes*). ICHNEUMONIDAN, a. *ĭk'nū-mŏn'ĭ-dăn*, relating to the ICH'NEUMON'IDÆ, *-dē*, a family of predaceous insects having the ichneumon-fly as its type. ICHNEUMON-FLY, general name for parasitic insects which destroy caterpillars and other insects. See ICHNEUMON (insect).

ICHNEU'MON (*Herpestes*): genus of digitigrade carnivorous quadrupeds of the family *Viverridæ* (q. v.), having a much elongated body, small head, sharp muzzle, rounded ears, and short legs. The species, which are numerous, are natives of Africa and warm parts of Asia. One, the ANDALUSIAN ICHNEUMON (*H. Widdringtonii*), occurs in the s. of Spain. They feed on small quadrupeds, reptiles, eggs, and insects. Some of them, particularly the EGYPTIAN ICHNEUMON (*H. Ichneumon*) and the MANGOUSTE, MUNGUS, or MONGOOSE (*H. griseus*) of India, have been greatly celebrated as destroyers of serpents and other noxious reptiles, many wonderful fables being related on this subject. The Egyptian Ichneumon, the ichneumon of the ancients, is larger than a cat, gray, with black paws and muzzle, and a black tuft of diverging hairs at the end of the tail. It abounds in Lower Egypt, but in Upper Egypt it is comparatively rare. It often enters houses, and devours poultry and their eggs. With noiseless gliding motion it advances on serpents until it can suddenly seize them from behind the head, where its long sharp teeth inflict a fatal wound. It scratches up the sand for the eggs of crocodiles, which it eats with great avidity. It was a sacred animal among the ancient Egyptians; the killing of it was forbidden; and individuals, for the maintenance of which funds were set apart, were objects of

worship. The ichneumon is easily domesticated, and forms a cat-like attachment to the place of its residence.

ICHNEU'MON: Linnæan genus of insects, now constituting a family or tribe, *Ichneumonidæ*, of the order *Hymenoptera*, section *Terebrantia*. The *Ichneumonidæ* are extremely numerous. Gravenhorst's *Ichneumonologia Europæa* describes nearly 1,650 European species, and they are equally abundant in other parts of the world. Many are minute, others are large; a few of the tropical species are among the largest of insects. They have the abdomen united to the thorax by a pedicle, often very slender. The abdomen itself is slender, and the whole form attenuated. The antennæ are generally thread-like, composed of a great number of joints, and are kept in constant vibration. The ovipositor in some is short; in some it is very long, much longer than the body of the insect, and inclosed in a kind of sheath formed of two parts, concave on their inner surface, from which it is disengaged when about to be used, the whole then seeming as three threads proceeding from the extremity of the abdomen. All the *Ichneumonidæ* deposit their eggs either in or on—generally in—the bodies, eggs, or larvæ of insects, or in spiders. Some deposit their eggs in aphides. They are thus extremely useful to the farmer and gardener, who except for their aid would often scarcely be able to defend his crop from his minute insect foes. Particular species of *Ichneumonidæ* are the natural enemies of particular kinds of other insects. Thus, *Microgaster glomeratus* and *Pimpla instigator* lay their eggs in the caterpillars of the cabbage butterfly. Some species deposit only one egg in the egg or larva which is destined to afford food to their own larva; others deposit a number of eggs together. Those which have a long ovipositor use it to reach eggs or larvæ under the bark of trees, in holes of wood, etc. The ichneumon larvæ generally consume only the fat of the larva on which they feed, which continues to subsist and so to sustain them until they are ready for transformation into pupæ. In their perfect state, the *Ichneumonidæ* feed only on the juices of flowers. They are often seen flying about umbelliferous flowers. The ichneumon larvæ are without feet.

ICHNITES, n. plu. *ĭk'nītz* [Gr. *ichnos*, a footprint]: in *geol.*, a term applied to all fossil footprints. ICH'NOLITE, n. *-no-līt* [Gr. *ichnos*, a footprint; *lithos*, a stone]: in *geol. and paleon.*, stone on which an ichnite or footprint of a fossil animal or bird is impressed.

ICHNOGRAPHY, n. *ĭk-nŏg'ră-fĭ* [Gr. *ichnos*, a footprint; *grăphō*, I describe]: a description of the ground-plan of a building; a horizontal section of a building or other object. ICH'NOGRAPH'IC, a. *-nō-grăf'ĭk*, pertaining to; describing a ground-plot: also ICH'NOGRAPH'ICAL, a. *-ĭ-kăl*.

ICHNOLOGY, n. *ĭk-nŏl'o-jĭ* [Gr. *ichnos*, a footprint *logos*, discourse]: in *geol.*, the principles and details in the investigation of the footprints or tracks of certain animals, or of the impressions made by meteoric or other transient physical forces, left on mud or sand now hardened into strata of rock: called also ICHNOLITHOLOGY, n. *ĭk'nō-lĭth-ŏl'ŏ-jĭ* [Gr. *lithos*, a stone; *logos*. discourse]. It is a section of the science of Paleontology. The actual remains of the hard portions of the animals themselves are the materials on which chiefly rests our knowledge of the former inhabitants of the globe; but of many animals we know nothing more than the more or less distinct impressions made by them as they moved over the surface of a muddy shore. And in some beds, not only is the evidence of the shore-wave preserved in the ripple-mark, and the influence of the sun's heat exhibited in the superficial cracks, but frequently the passing hail-storm, or the sudden and heavy thunder-shower, has left its impress upon them, and this so perfectly, that it is not difficult to determine, from the form of the cup-like depression, whether or not the rain was accompanied by a breeze, for, by observing the amount of difference in the sides of the cup, and the position of the highest side, the direction of the gale and its velocity may be approximately determined. Though the force or the body forming the impression has been removed immediately after it has made the pressure, yet in these prints the evidences of animal life and of the activity of physical forces, have come down to us from the remotest periods. The impressions occur almost invariably on rocks that have been deposited as mud; only in a few cases have they been noticed in sandstone. Sometimes the argillaceous deposit is a thin layer between two sandstone beds; it is then difficult to obtain a clear surface in the shale; but the details are carefully preserved in relief in the natural cast on the under surface of the superimposed sandstone.

The necessary conditions for the preservation of footprints seem to be either of the following. The silt-bed may have formed an extensive flat shore, uncovered by the tide at each ebbing. Whatever impressions were made on this plastic surface would be baked and hardened by the influence of the sun, if it remained for a sufficient time uncovered by the water; and when the tide again flowed, the hardened mud, resisting its influence, would receive another film of sediment, which would specially deposit itself in the depressions, and thus secure the permanence of the impressions. These influences would operate more powerfully on portions of the shore which were under water only at spring-tides. The impressions of numerous wading birds are preserved in this manner at the present day, on the plastic mud which covers the flat shore of the Bay of Fundy, where the tide rises, it is said, sometimes as much as 70 ft. Both Gould and Lyell have given detailed accounts of the process as it goes on there. The other method is one independent of the sun's influence, where on an ordinary muddy shore during the recession of the

tide, the depressions are filled up by blown sand, and the tide, on its return, flows over a level surface, on which it deposits a fresh layer of silt.

The study of ichnology carries us back to the remotest known period of animal life on the globe. The deposit from which has been obtained the fragment of the oldest known trilobite (Palæopyge), contains the borings of certain worms (fig. 1) and impressions of rain-drops. In strata of the same period, but a little later, series of regularly recurring groups of markings are considered by Salter as having been produced by the sharp claws of crustacea in walking; while other sets he refers, with considerable probability, to the strokes of the bifurcate tail of an unknown crustacean as it swam through shallow water. From the American representatives of the same rocks (Potsdam sandstones), Prof. Owen has described a number of impressions made apparently by different animals, to which he has given the generic name of Protichnites. The slabs show that the animals made at each step 14, 16, or more impressions. They were probably crustacea, furnished with three or four pairs of bifurcating limbs, like the modern king-crab. Similar impressions have been observed in the Lower Silurian rocks of Eskdale in Scotland, and have been named *P. Scoticus*. The tracks of numerous annelids also occur in these rocks. They exhibit the impressions of the creatures as they moved along, or sometimes through, the soft mud, and they frequently terminate in a distinct impression of the form of the worm itself, produced perhaps by the dead body, though no trace of the body itself is preserved (fig. 2). The footprints of a small reptile had been observed on the sandstone of a quarry near Elgin, Scotland, which probably belongs to the Old Red Sandstone Measures. In 1851, it was discovered that they were produced by a little reptile (*Telerpeton Elginense*), whose remains were there found. And more recently, Prof. Huxley has referred a different set of impressions to the remarkable fish-like reptile, Stagonolepis, which he describes. The Coal Measures of Britain and of Germany have disclosed the footprints of different reptiles.

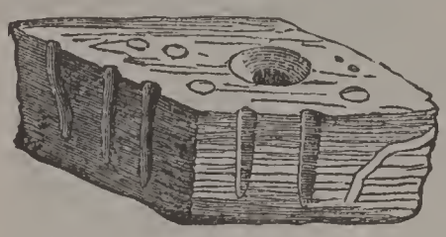


Fig. 1.—Annelid Borings (Arenicolites): From Cambrian Rocks.

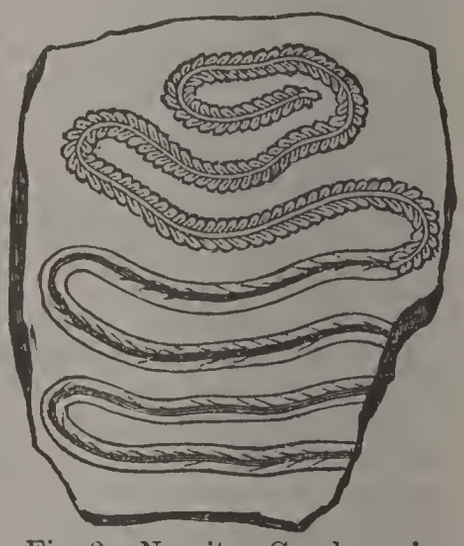


Fig. 2.—Nereites Cambrensis: From the lower Silurian Shales of Moffat.

The New Red Sandstone strata abound in footprints. It was the Permian or lower division of this series that supplied, 1828, the impressions which gave the first indication

of animal life from such evidences to the mind of Dr. Duncan. The tracks that he described occur on the layers of unctuous clay which separate the beds of sandstone in the quarries at Corncockle, Dumfriesshire; they frequently are clear and delicate, as at the moment when they were

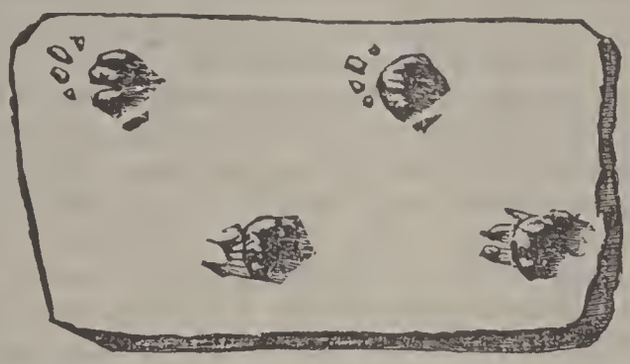


Fig. 3.—Footprints of a Tortoise:
From the Permian Sandstone of Annandale.

impressed, and are repeated bed after bed on the fresh tablets as they were prepared for their reception. From their number and direction, they seem to be the tracks of animals passing together across an estuary from which the tide had receded, to some frequented ground periodically sought for food or pleasure. No animal remains have been found associated with them; they seem, however, to belong to forms of tortoise. The slab figured is a portion of the track probably of a long-tailed Chelonian, with a stride a little over six inches. The pad of the foot was soft and smooth; the light impressions of the fore-foot were nearly obliterated by the hind-foot, which was furnished with four claws (fig. 3). Sir William Jardine, on whose property the Corncockle quarries are, has made these tracks the subject of a valuable and elaborate monograph.

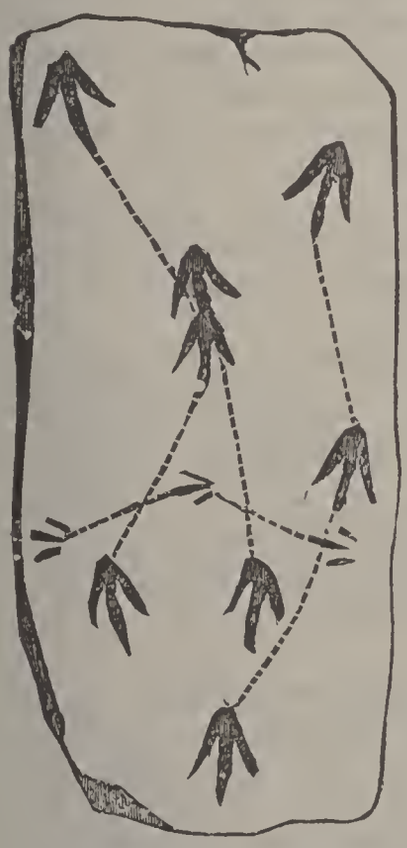


Fig. 4.—Footprints of Birds:
On the Oolitic Sandstones of Connecticut.

In the Triassic rocks, the well-known foot-tracks of the Labyrinthodon (q.v.) occur.

The earliest evidence of the existence of birds are the traces of their feet in the argillaceous sandstones of the valley of the Connecticut, now known to be of the Lower Oolitic age. The structure of the tridactyle feet which produced these impressions shows the regular progression in the number of the toe-joints from the innermost to the outermost toe peculiar to birds, and they must be taken as evidencing the occurrence thus early of

the class, though a considerable interval elapses before the first true fossil of a bird occurs; viz., the archæopteryx. Pres. Edward Hitchcock, of Amherst College, showed that a majority of the tracks ascribed to birds were by reptiles that walked on their hind feet. His report to the state of Massachusetts, 1836, gives 38 places in which he had found ichnolites, with the footprints of 119 species of animals—quadrupeds, birds, crustaceans, tortoises, saurians, batrachians, insects, etc. In the Amherst College museum is the collection of Connecticut valley ichnolites, showing more than 20,000 distinct tracks. Some tracks have been found in the same formation in New Jersey. The tracks of several species of Odontornithes (q. v.), toothed birds of Kansas, were described by Prof. Marsh, 1880. Immense tridactyle footprints have been known for many years in rocks of Wealden age in the s. e. of England. At first, they were supposed to be birds; but examination has shown them to belong to reptiles; and the discovery in the same strata of the perfect foot of a young iguanodon, measuring 21 inches in length, and furnished with three toes, which would form a print precisely similar to the tracks so long known, shows them to have been certainly produced by the Iguanodon (q. v.).

ICHOR, n. *ī'kŏr* [Gr. *ichōr,* matter, gore]: the supposed colorless blood of the heathen deities; a thin watery humor like whey flowing from an ulcer. ICHOROUS, a. *ī'kō-rŭs,* like ichor; watery; serous.

ICHORHÆMIA, n. *ī-kŏr-hē'mĭ-a* [Gr. *ichōr; haima,* blood]: in *path.,* same as PYÆMIA (q. v.).

ICHTHELIS, n. *ĭk'thĕ-lĭs* [Gr. *ichthus,* a fish; *helios,* the sun]: typical genus of the sub-family *Ichthelinæ,* and the family *Ichthelidæ,* the sun fishes of Jordan, a family of Acanthopteri.

ICHTHYIC, a. *ĭk'thĭ-ĭk* [Gr. *ichthus,* a fish]: relating to fishes. ICH'THYOCOL, n. *-ō-kŏl,* or ICH'THYOCOL'LA, n. *-kŏl'lă* [Gr. *kolla,* glue]: fish-glue; isinglass. ICH'THYOCOP'RUS, n. *-kŏp'rŭs* [Gr. *kopros,* dung], also ICH'THYOCOP'ROLITE, n. *-kŏp'rō-līt* [Gr. *kopros,* dung; *lithos,* a stone]: the fossil dung of fishes. ICH'THYODOR'ULITE, n. *-dŏr'ū-līt* [Gr. *doru,* a spear; *lithos,* a stone]: fossil fin-spine of a fish. ICH'THYOG'RAPHY, n. *-ŏg'ră-fĭ* [Gr. *graphō,* I write]: a treatise on fishes.

ICHTHYODOR'ULITE [Gr. fish-spear-stone]: fossil fin-spine of a fish, such as are found in the stratified rocks. Plagiostomous fishes have their dorsal fin furnished in front with a strong bony spine. The fin is connected with the spine, and is elevated and depressed by its movement. It seems also to be employed by the fish as a defense against its larger foes. Some bony fishes have similar spines, as the Sticklebacks, Silurids, etc. The spines are most frequently unassociated with any fish remains, having belonged to plagiostomous fish, in

which the spine is simply implanted in the flesh, and consequently would be speedily separated from the body of the fish when it began to decompose.

The earliest certain evidence of vertebrate animals is the spines of plagiostomous cartilaginous fishes in the bone bed of the Ludlow rocks, the uppermost of the Silurian deposits. Spines belonging apparently to three species have been found; they are small, compressed, slightly curved, and finely grooved lengthwise, and belong to the genus Onchus. With them have been found petrified portions of tubercular and prickly skin, like the shagreen of the shark. The Old Red Sandstone has supplied such a variety of spines as to have afforded the materials for establishing 14 genera; and in the Coal Measures they are more numerous, belonging to no less than 21 genera.

ICHTHYOID, a. *ĭk'thĭ-oyd* [Gr. *ichthus*, a fish; *eidos*, likeness]: resembling a fish. ICHTHYOL, bituminous mineral found in the fossiliferous rocks of the Tyrol, having sulphur as its chief ingredient, probably a residue from the bodies of fishes. By distillation the oil of ichthyol is separated from the tarry matter, and is used as a remedy for diseases of the skin. ICH'THYOLITE, n, *-ō-līt* [Gr. *lithos*, a stone]: a fossil fish, or any portion of a fish. ICH'THYOL'OGY, n. *-ŏl'ŏ-jĭ* [Gr. *logos*, a discourse]: branch of zoology which treats of the structure, the classification, the habits, and the history of fishes. ICH'THYOLOG'ICAL, a. *-lŏj'ĭkăl*, pertaining to. ICH'THYOL'OGIST, n. *-jĭst*, one versed in. ICH'THYOMAN'CY, n. *-măn'sĭ* [Gr. *manteia*, divination]: divination by the entrails, etc., of fishes.

ICHTHYOL'OGY: branch of natural science which treats of fishes. Aristotle is the most ancient author having any claim to be noticed in a history of ichthyology: this science was little cultivated by any other of the ancients. In modern times, it began to be cultivated, about the middle of the 16th c., by Belon, Rondelet, and Salviani. Toward the close of the 17th c., it made great progress through the labors of Willoughby and Ray; in the 18th c., through those of Artedi, Klein, Linné, Gronow, Brunich, Scopoli, and Bloch; in the beginning of the 19th c., through those of Cuvier and De la Cépède; while, more recently, Valenciennes, Müller, Agassiz, and Owen are eminent among many who have prosecuted the study with ardor and success. Yarrell produced an excellent work on British Fishes. The earlier ichthyologists generally included the *Cetacea* among fishes. Linné (Linnæus) removed the *Cetacea* to their proper place. His system of ichthyology is almost as artificial as his system of botany. It is founded on the relative positions of the pectoral and ventral fins, without reference to any important point of comparative anatomy or animal economy. Cuvier's classification (see FISHES) shows an enormous advance in naturalness and in scientific ac-

curacy. The system of Agassiz, founded on the external covering of fishes (Placoids, Ganoids, Ctenoids, Cycloids), is also highly artificial, though found convenient for fossil ichthyology. Johannes Müller made many important modifications of the Cuvierian system; and the latest researches seem to show that, with further corrections and extensions, the system aimed at by him is really a natural one. See Günther's *Introduction to the Study of Fishes* (1880). See FISHES: VERTEBRATA.

ICHTHYOMORPHA, n. *ĭk'thĭ-ō-mŏr'fă* [Gr. *ichthus,* a fish; *morphē,* form, shape]: an ord. of Amphibians, also called *Urŏdēlă,* comprising the fish-like newts, and others.

ICHTHYOPATOLITES, n. plu. *ĭk'thĭ-ō-păt'ō-līts* [Gr. *ichthus,* a fish; *patos,* a footpath; *lithos,* a stone]: in *geol.,* fish-tracks, or the imprints of the pectoral fin-rays of certain fishes. ICH'THYOPH'AGIST, n. *-ŏf'ă-jĭst* [Gr. *phagō,* I eat]: one who eats or lives on fish. ICH'THYOPH'AGOUS, a. *-gŭs,* fish eating. ICH'THYOPH'AGY, n. *-jĭ,* fish diet or eating.

ICHTHYOPHTHALMITE, n. *ĭk'thĭ-ŏf'thăl-mīt* [Gr. *ichthus,* a fish; *ophthalmos,* the eye]: fish-eye-stone; a variety of pyramidal zeolite, having a peculiar pearly lustre. ICH'THYOPTERYG'IA, n. *-ŏp'tĕr-ĭj'ĭ-ă* [Gr. *pterux,* a wing or fin]: an order of reptiles, living and extinct, having limbs formed for swimming like fins.

ICHTHYOPHTHIRA, n. *ĭk'thĭ-ŏf-thī'ră* [Gr. *ichthus,* a fish; *phtheir,* a louse]: an order of crustacea, comprising animals parasitic upon fishes.

ICHTHYOPSIDA, n. *ĭk'thĭ-ŏp'sĭ-dă* [Gr. *ichthus,* a fish; *opsis,* appearance]: the primary division of the Vertebrata comprising the Fishes and Amphibia, also called *Branchiate Vertebrata.*

ICHTHYOSAU'RUS [Gr. *ichthus,* fish; *sauros,* lizard]: remarkable genus of reptiles which inhabited the sea during the deposition of the Secondary strata. Like the modern Cetacea, their structure was modified to suit their aquatic life. The body was shaped like that of a fish, the limbs were developed into paddles, and the tail, long and lizard-like, was furnished, it is believed, with a fleshy fin, as in the dolphin, except that its position was vertical. The head was large, and produced into a long and pointed snout, resembling that of the crocodile, except that the orbit was much larger, and had the nostril placed close to it, as in the whale, and not near the end of the snout. The jaws were furnished with a large series of powerful conical teeth, lodged close together in a continuous groove, in which the divisions for sockets, which exist in the crocodile, were indicated by the vertical ridges on the maxillary bone. The teeth were hollow at the root, sheathing the young teeth, which gradually absorbed the base of the older ones, and, as they grew, pressed them forward and finally displaced them. The long and slen-

der jaws were strengthened to resist any sudden shock by being formed of many thin bony plates, which produced light and elastic as well as strong jaws. The most remarkable feature in the head was the eye, which was not only very large—in some specimens measuring 13 inches in diameter—but was specially fitted to accommodate itself for vision in air or water, as well as for speedily altering the focal distance while pursuing its prey. The structure, which thus fitted the eye so remarkably to the wants of the animal, consisted of a circle of 18 or more overlapping sclerotic bony plates surrounding the pupil, as in birds. This circle acted as a sort of self-adjusting telescope, and accompanied by the extraordinary amount of light admitted by the large pupil, enabled the ichthyosaurus to discover its prey at great or little distances in the obscurity of the night, and in the depths of the sea. The neck was so short that the body was probably not in the least constricted behind the head. The backbone was fish-like; each joint had both its surfaces hollow, making the whole column very flexible. The small size of the paddles compared with the body, and the stiffness of the short neck, seem to suggest that the tail must have been an important organ of motion. Prof. Owen is satisfied that it was furnished with a vertical tail, because the vertebræ are compressed vertically, and also because the tail is frequently found disarticulated a short distance from its extremity, as if the weight of the upright tail had caused it to fall when the animal had begun to decompose. The fish-like body, the four paddles, and especially the powerful tail, would make the ichthyosauri active in their movements; and consequently, with their predaceous habits, very dangerous enemies to the other animals that inhabited with them the Secondary seas. That their principal food consisted of fishes is evident from the masses of broken bones and scales of contemporary fishes that have been found under their ribs in the place where the stomach of the animal was situated.

The remains of the ichthyosauri are peculiar to the Secondary strata, occurring in the various members of the series from the Lower Lias to the Chalk, but having their greatest development in the Lias and Oolite. More than 30 species have been discovered; they differ from each other chiefly in the form of the head, some having a long and slender snout, like the gavial of the Ganges, while others had short and broad heads, more like the common crocodile. The great repository for ichthyosaurian remains hitherto has been the Lias at Lyme Regis, England. They are found also in rocks of the same period in France and Germany; and Prof. Marsh of Yale Univ. described portions of a saurian skeleton found in the Rocky Mountains resembling that of the ichthyosaurus; no remains of the true ichthyosaurus have been found in America.

ICHTHYOSIS: fish-skin disease; a malformation of the skin, which is markedly and constantly dry and more or less rough and scaly. The epidermis accumulates in horny scales, sometimes overlapping like fish-scales, sometimes separated by depressed lines which often have a dirty, greenish-black color. The scales themselves may have a green color. Desquamation is always present, the superficial scales being thrown off and replaced by new accretions from below. The disease is believed to be congenital, but it often does not declare itself before the second or third year. It varies in intensity from time to time; in some persons the skin becoming almost normal in warm weather and the harshness returning with the setting in of winter. The disease is apparently incurable, but much can be done by judicious treatment to improve the condition of the skin. Among the most efficacious measures is the hot bath, accompanied by the use of soft-soap, and scrubbing with a nail-brush and followed by the application of some soothing ointment, such as the glycerole of starch. Removal to a tropical climate, when that is possible, gives the best results.

ICHTHYPHALLIC, a. *ĭk'thĭ-făl'lĭk* [Gr. *ichthus*, a fish, and *phallus*, which see]: pertaining to *ich'thyphal'lus*, or fishgod worship of the anc. Egyptians.

ICHTHYS, n. *ĭk'thĭs* [Gr. a fish]: a word found on many articles, as rings, seals, tombstones, belonging to the early years of Christianity, during the struggle against paganism. It is supposed to have had a mystical meaning, from the fact that the several characters are the initial letters of the Greek words *Iēsous Christos, Theou Huios, Sōtēr*, 'Jesus Christ, the Son of God, the Saviour.' It was thus, in days of persecution, a concealed confession of faith in Christ. It may have been suggested by the fact that some of the apostles were fishermen.

ICICA, *ĭ'sĭ-ka* or *ĭs'ĭ-ka:* genus of trees of nat. ord. *Amyridaceæ*, having pinnate leaves with an odd terminal leaflet, and white flowers in panicled racemes: the flowers having a small 5-toothed calyx, 5 petals, 10 stamens, and a cup-shaped disk with 10 crenatures on the margin, the fruit a drupe.—*I. icicariba* yields the American Elemi (q. v.).—*I. heterophylla*, a tree of Guiana, yields a yellow aromatic balsam, which long retains its fluidity, and is used as an application to wounds. The resinous seeds are very fragrant.—*I. heptaphylla* and *I. Guianensis*, also natives of Guiana, yield very fragrant balsams, which harden into a gray resin, used as incense in churches and for other purposes, and esteemed as a medicine in dysentery.—*I. altissima* is a tree 100 ft. high, native of Guiana, of which the wood is known as *White Cedar* and *Red Cedar*, and as *Acuyori, Samaria, Mara*, and *Curana Wood:* it is used for furniture and house-carpentry, and for canoes.

ICICLE, ICING, ICY: see ICE. ICICLES, in *her.*, are charges of the same shape as drops in the bearing called Gutté (q.v.), but reversed; called also Clubs, Locks of Hair, and Guttés reversed.

ICILIUS, *ĭ-sĭl'ĭ-ŭs:* plebeian family in Rome, which produced some of the most zealous defenders of the plebeian interest against the patricians. The name of one of them is associated with one of the most touching incidents in the legendary history of Rome (see APPIUS CLAUDIUS).

ICO, *ē'kō:* town of Brazil, province of Ceara, on the Salgado, 210 m. n.w. of Parahiba. The people mostly are shopkeepers, who supply the interior with articles of European manufacture, receiving produce in return, which they send down to the coast. Pop. 6,000.

ICOD, *ē-kŏd'*, or ICOD DE LOS VINOS, *ē-kŏd' dā lōs vēn'yōs:* small town on the n.w. coast of Teneriffe, one of the Canaries (q. v.). Pop. about 5,500.

ICOLMKILL'. See IONA.

ICO'NIUM. See KONIEH.

ICONOCLAST, n. *ī-kŏn'ŏ-klăst* [Gr. *eikon,* an image, *klastēs,* a breaker—from *klăō,* I break]: breaker or destroyer of images used in worship; a name given first in the 8th century to those who destroyed the images in churches, or who were opposed to rendering religious reverence to statues, pictures, and other sensible representations of sacred things. I'CONOCLAS'TIC, a. *-tĭk,* breaking images. ICONOCLASM, n. *-klăzm,* the act of.—The iconoclast movement had its commencement in the Eastern Church. Opinion is divided as to the origin and antiquity of the practice of Image-worship (q. v.) in the church; but it is certain that in the 6th and 7th c. it prevailed extensively, especially in the Eastern Empire, and that practices of it in some churches were a source of much suspicion and offense. Many bishops interposed to correct these abuses; but the iconoclast movement, strictly so called, began with the imperial edict issued 726 by Emperor Leo III., surnamed the Isaurian, forbidding the honors paid to sacred images, and even commanding the removal from the churches of all images, that of our Lord alone excepted. This was followed by another decree 730, which prohibited, under pain of death, as sinful and idolatrous, all acts of reverence, public or private, to images, and directed that, wherever such images should be found, they should forthwith be removed or destroyed. The attempt to enforce this decree occasioned great agitation, especially in the Greek islands and in Italy. The popes Gregory II. and Gregory III. protested vehemently against it, repudiated the imputation of idolatry, and explained the nature of the honors to images for which they contended. Leo persevered, nevertheless, in his opposition, which was continued by his successor, Constantine, surnamed Coprony-

mus. Under this emperor, a council was held in Constantinople 754, in which the inconoclast decrees were affirmed in their fullest extent; and Constantine's son, Leo IV., renewed, on his accession 773, the enactments of his predecessors. Under the widow of Leo, Empress Irene, a council was held at Nice, 786 (see IMAGE-WORSHIP), in which these proceedings were condemned and revoked; but succeeding emperors, Nicephorus (802-811), Leo the Armenian (813-820), Michael the Stammerer, and Theophilus, returned with greater or less severity to the policy of the iconoclast emperors. As regards the Greek Church, the controversy may be said to have been finally settled under Empress Theodora in a council held at Constantinople 840, or at least by a subsequent one of 870. The modern usage of the Greek Church permits pictures, but rejects graven or sculptured representations of sacred objects. Except in Italy, the iconoclast controversy created but little sensation in the Western Church until the movement in the time of Charlemagne and his successors (see IMAGE-WORSHIP).—In the modern church, the popular violences directed in Switzerland, Great Britain, and some parts of Germany, against crucifixes, images of saints, and other objects associated with what has been stigmatized as the idolatry of Rome, have sometimes been described under the name of Iconoclasm.

ICONOGRAPHY, n. *ī'kŏn-ŏg'ră-fĭ* [Gr. *eikon,* an image; *graphō,* I describe]: the description of anc. images or statues; the art exercised by the image-makers of all ages of expressing in sculpture, carving, and painting, actual persons and events, or abstract and spiritual notions.

ICONOLATOR, n. *ī'kŏn-ŏl'ă-tĕr* [Gr. *eikon,* an image; *latreia,* religious service—from *latris,* a servant]: one who worships images. I'CONOL'ATRY, n. *-trĭ,* the worship of images. I'CONOL'OGY, n. *-ŏ-jĭ* [Gr. *logos,* a discourse]: the doctrine of images or emblematical representations; a description of pictures or statues.

ICONOMACHY, n. *ī'kŏn-ŏm'ă-kĭ* [Gr. *eikon,* an image; *machē,* a fight]: strong hostility to images and pictures as objects of worship or reverence.

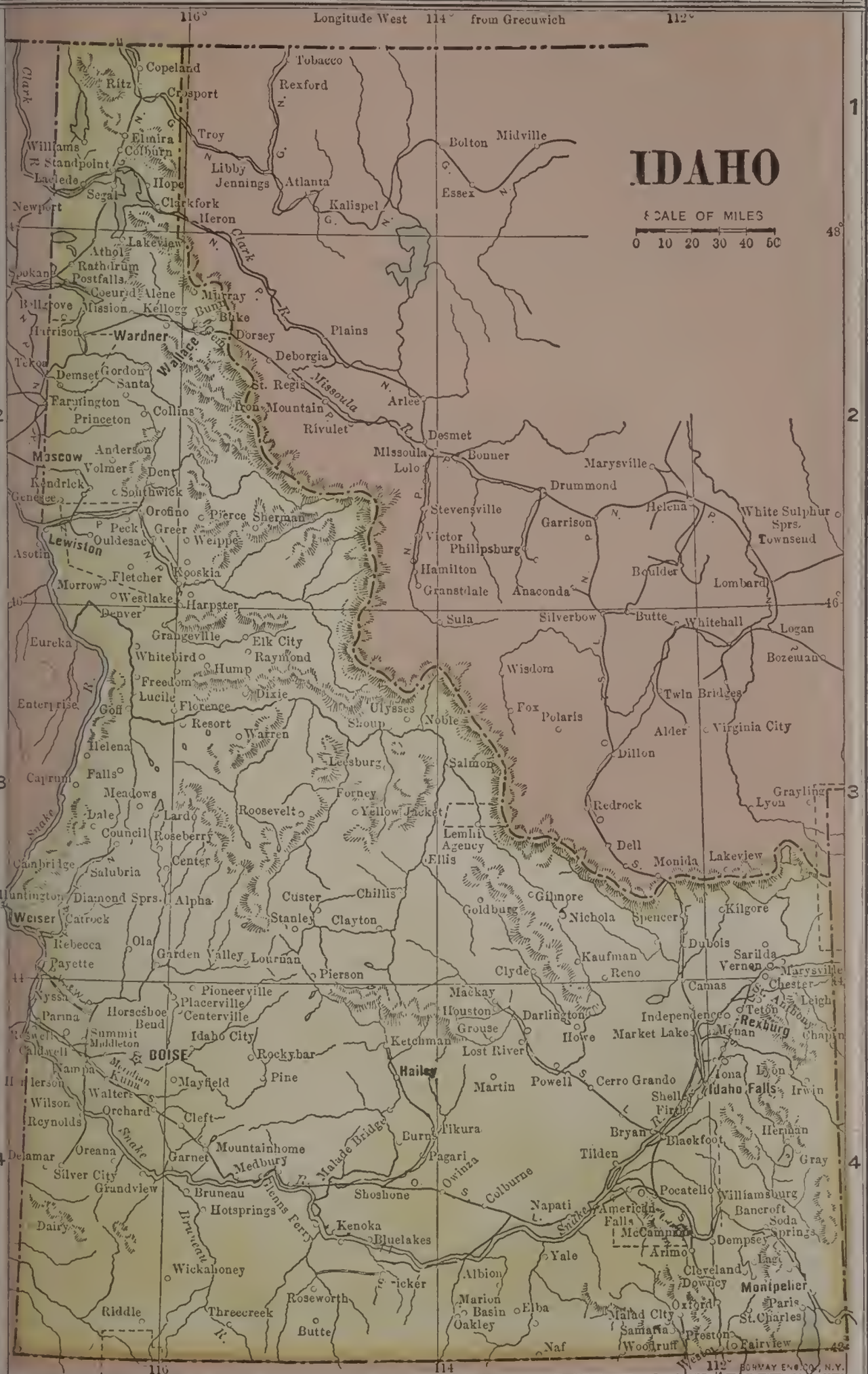
ICONOPHILIST, n. *ī'kŏn-ŏf'ĭl-ĭst* [Gr. *eikon,* an image; *phileō,* I love]: a connoisseur of pictures or gems; a collector or judge of prints.

ICOSAHEDRON, n. *ī'kŏs-ă-hē'drŏn* [Gr. *eikŏsĭ,* twenty; *hĕdră,* a seat, a basis]: a solid of twenty faces. I'COSAHE'DRAL, a. *-drăl,* having twenty faces. ICOSANDRIAN, a. *ī'kŏs-ăn'drĭ-ăn,* or I'COSAN'DROUS, a. *-drŭs* [Gr. *anēr,* or *andra,* a male]: in *bot.,* having twenty or more stamens inserted on the calyx.

ICTERIC, a. *ĭk-tĕr'ĭk,* or ICTER'ICAL, a. *-ĭ-kăl* [L. *ictĕrŭs,* jaundice: F. *ictère*]: affected with jaundice; good in the cure of the jaundice. ICTERUS, n. *ĭk'tĕr-ŭs,* jaundice.

Area in Square Miles, 84,800.
Number of Counties, 21.

Population, 161,772.
Capital of State, Boise.



ICTERINÆ, n. *ĭk-tĕr-ī'nē* [L. *icterus*]: hangnests; typical sub-family of the family *Icteridæ*, the orioles, a family of *Passeres*, insessorial birds.

ICTUS, n. *ĭk'tŭs* [L.]: a blow; a stroke; as *ictus solis*, sunstroke; cadence, emphasis; stress on an accented syllable.

I'CY CAPE: a headland of N. America, lat. 71° n., about the middle of that long reach of the arctic coast between Cape Lisburne on the s.w., and Cape North or Point Barrow on the n.e. It was discovered by Cook 1778, and was his furthest point n. of Behring's Strait.

ID., adv. *ĭd:* a contraction for idem (q. v.).

I'D: contr. for *I would* or *I should. I had* was formerly but erroneously regarded as the full spelling of the contr. I'd.

IDA, *ī'da:* high mountain range, in Asia Minor, extending from Phrygia through Mysia into Troas. The city of Troy was at its base. It is the scene of many ancient legends. The s. part of the range was called Gargarus, the highest peak of which is about 4,700 ft. above the sea. Here was a temple of Cybele, who therefore was called the *Idæan Mother.* From Ida flow several famous streams, as the Granicus, Simois, and Scamander.—Another Ida is in Crete, extending from w. to e., now called Psiloriti: here Zeus was said to have been educated.

IDÆAN, a. *ĭ-dē'an* [L. *Idæus*]: of or pertaining to Mount Ida, in Crete.

IDAHO, *ī'da-hō:* state; one of the United States of America; 44th in order of admission into the Union, 31st under the federal constitution; created from the terr. of Idaho, and admitted by presidential proclamation 1890, July 3.

Location and Area.—Idaho is in lat. 42°—49° n., long. 111°—117° w.; bounded n. by British Columbia, e. by Mont. and Wyo., s. by Nev. and Utah., w. by Ore. and Wash.; extreme length n. to s. 485 m., mean breadth (at parallel 44° 30′) 257 m.; 84,800 sq. m. (54,272,000 acres); cap. Boisé City. Part of the e.s.e section is within the Yellowstone National Park, and large tracts in the s.e. are "sink" lands with subterranean streams.

Topography.—The surface is diversified: mountainous but with rich broad valleys in the n., basaltic in the bend of Snake river, and again mountainous, though more abrupt, with fertile valleys in the s. From the Bitter Root Mountains, which on the n.e. divide Idaho from Montana, extend numerous spurs westward to the Sierra Nevadas. The Bitter Root range is a portion of the Rocky Mountain system. In the central part is the Salmon range, which in general flows the course of the Salmon river. Many of the summits of these ranges and their spurs are from 8,000 to 12,000 ft. high, rugged and snow-capped. The Saw Tooth range in the w. center, and the Goose Creek and Bear river ranges in

the s., are the other chief ranges, the last two stretching across the state. Other mountains and peaks of note are the Kootenai, near the n. border; Cœur d'Alêne, Clearwater, Weiser, Payette, Boisé, Three Buttes, Saw Tooth, Owyhee, in the s.w.; Goose Creek, and Bear River, in the s.e. corner. The territory has a superior river system. The s.e. corner is drained by the Bear river into Great Salt Lake and the remainder by streams tributary to the Columbia river. Snake river or Lewis Fork of the Columbia flows nearly 1,000 m. through the w. and s., and during high water is navigable for 200 m. within the territory. It has 3 falls: the American, 60-70 ft.; Shoshone, 25-30 ft.; and Salmon, 20 ft. Its chief tributaries are the Bruneau, s., Malade, n., and the Boisé, Payette, Weiser, Salmon, Clearwater, and Palouse, e. Spokane river drains Cœur d'Alêne lake and extends into Washington Terr., where it joins the Columbia river. Wood river in s. central Idaho drains a tract 140 m. n. to s., and 100 m. e. to w., one of the richest silver districts in the world, locally known as 'the second Leadville,' and is a clear strong current 150 ft. wide and 3 to 4 ft. deep. It has 12 tributaries, rivers and creeks, whose names have been given to notable mines. This district rises from an elevation of 5,200 ft. at Bellevue to between 8,000 and 9,000 ft. at Galena, in a stretch of 45 m. The Wood is a branch of the Snake river. The principal lakes in Idaho are Pend d'Oreille, Cœur d'Alêne, Tessentines, Bear, Henry's, and the Payette cluster.

Climate.—The atmosphere is generally very dry. The spring, summer, and autumn months are delightful; intense cold and heavy snows prevail during the winter in the mountainous parts, but the valleys are quite equable, and cattle may winter in them without shelter. In some of the s. sections the aridity almost produces a desert, while in the n. there is usually sufficient rainfall to facilitate agricultural operations without irrigation. In the w. the temperature averages that of central Illinois, Indiana, and Ohio, and in the e. it is similar to that of n. Massachusetts, s. Vermont, and New Hampshire.

Geology.—The chief mineral productions are gold, silver, and lead, which are found in every county, and are remarkably pure. Sulphur, soda, magnesia, lime (carbonates and sulphate), and salt abound; and there are extensive veins of coal, iron, and valuable building stone. Its lead is the purest in the country, the Cœur d'Alêne district producing about one-third of all in the United States. The gold is distributed all through the state; not only in the quartz, but in the gravels of the rivers, especially the Boisé (the most noted), the Salmon, and the Snake. Dredging from the Snake river bed is carried on; but the great event of 1902 was the discovery of immense new quartz ledges in the Thunder Mountain district, which are expected to raise production to the old level of the days before the partial exhaustion of

the placers. The annual value of metal products is: gold, about $2,000,000; and silver about $5,000,000. Copper and lead are also produced in large quantities.

Agriculture.—About 10,000 sq. m. are covered with forests yielding black pine, and the finest white and yellow pine, spruce, fir, and cedar, some of the latter trees being 4 ft. in diameter, and fully 60 ft. high without a limb. While the valleys are productive in cereals, garden vegetables, and fruit, the chief agricultural asset of the S. is its unexcelled grazing lands, of which the white sage, preferred by cattle, covers about 16,000,000 acres. Cereals are cultivated in the S. by the aid of irrigation, while corn, wheat, oats, rye, potatoes, hay, and flaxseed flourish in the valleys of the larger rivers. Altogether there are about 18,000 farms, comprising approximately 3,500,000 acres, of which fully one-third is improved land. The total value of all farm property in the State, including lands and improvements, implements and machinery, and live stock is about $65,000,000. The raising of vegetables to supply the mining towns is assuming more and more importance, while the culture of fruits is also being more extensively undertaken each year, apples and prunes being the most notable fruit products. The entire fruit yield of one year is worth more than $400,000.

Manufactures.—There are about 400 manufacturing establishments, with aggregate annual outputs valued at about $10,000,000. The chief industry is the production of lumber and planing-mill products, with flour milling next, followed by railroad cars, malt liquors, butter, foundry and machine-shop products, harness saddlery, furniture, cigars, etc.

Education.—There are nearly 70,000 children enrolled in the public schools of I., with about 2,100 teachers. There are also about a dozen private academies, 2 State normal schools, a State Academy, 2 industrial schools for Indians, an agricultural and technological school, and the University of I.

Religion.—Mormonism is the prevailing religion, probably on account of the proximity to Utah and the early activity of the Mormon missionaries in I. In 1883 all Mormons were disfranchised, but 10 years later, when the Mormon Church disclaimed polygamy, the law was repealed. The Roman Catholic Church is the next strongest, followed by the Methodist and Baptist.

Railroads.—At present there are not more than 2,000 miles of track in the S., the Northern Pacific being the largest road. There are also about 100 miles of street railway.

Finance and Banking.—The bonded debt of I. is $1,600,000, and the assessed valuation of realty property $125,000,000. There are nearly 120 State and national banks, besides private banks and trust companies. The latter, however, are of minor importance.

History.—Idaho, an Indian name meaning 'Gem of the

Mountains,' was explored by Capts. William Clarke and Meriwether Lewis 1805-6, who traversed the two forks of the Columbia river bearing their names. Gold was found in the n. portion 1858, but no permanent settlement was made till 1860. Idaho formed a portion of Oregon Territory till 1863, and then, on the organization as a territory, was given parts of Oregon, Washington, Utah, and Nebraska. The next year a part of it was set off to Montana, and the remainder has comprised its limits since. For several years the people of Idaho were agitated over a project involving the annexation of the four n. cos. to Washington Territory, to aid the latter in seeking admission into the Union. A bill for the admission of Washington Territory with that part of Idaho included was introduced into congress 1881, Jan., and at once aroused the strongest opposition in Idaho. Both of the leading political parties, at their territorial conventions 1888, pronounced against the threatened dismemberment and urged preliminary steps for the admission of the whole territory as a state of the Union. In his message to the legislature 1888, Dec., Gov. Stevenson recommended that provision be made for a convention that should adopt a constitution and forward it to congress with a petition for admission, without awaiting the passage of an enabling act by congress. This recommendation was adopted, and a constitutional convention assembled at Boisé City 1889, July 4, and proceeded to draft a constitution, which was ratified by the people and duly certified to congress. The territory was proclaimed a state 1890, July 3. Miners' strikes in 1892 and 1899 caused great disturbances resulting in the bringing in of U. S. troops; in 1907, Idaho was the scene of the trial of the officers of the Western Federation of Miners for complicity in the murder of Gov. Steunenberg.

Government.—The executive authority is vested by the constitution in a governor, salary $5,000 per annum; lieutenant-governor, a salary per diem while the legislature is in session equal to that of the speaker of the house; secretary of state; auditor; treasurer; attorney-general; and superintendent of public instruction; all these officers are to be elected for two years. The legislative authority is vested in an assembly, comprising a senate of 21 members (future limit 24) and a house of representatives of 46 members (future limit 60), all elected for two years; salary of senators and representatives $5 a day, provided the amount does not exceed $300 for an entire session, and 10 cts. mileage; sessions biennial, and extra ones limited to 20 days. The judicial authority is vested in a court for impeachments (the senate); a supreme court of three judges elected for six years; five district courts with judges elected for four years; probate courts; board of pardons (gov., sec. of state, and atty.gen.); and justices of the peace, with jurisdiction in cases not exceeding $300. The constitution declares that the exercise of

religious faith and worship shall be guaranteed forever, and that no person shall be denied any civil or political right or privilege, on account of his religious opinions; but the liberty of conscience thus secured shall not be construed to dispense with oaths or affirmations, or justify polygamous practices, nor to permit any person or organization, directly or indirectly, to aid or abet polygamy.

The successive govs., with their terms of office, are as follows: William H. Wallace 1863-4; Caleb Lyon 1864-66; David W. Ballard 1866-7; Isaac L. Gibbs, 1867-8; David W. Ballard 1868-70; Gilman Marston 1870-1; Thomas W. Bennett 1871-75; Mason Brayman 1877-8; John P. Hoyt 1879; Mason Brayman 1880; John P. Neil 1880-83; John N. Irwin 1883; William N. Bunn 1884-5; Edward A. Stevenson 1885-89; George E. Shoup 1889-93 (elected U. S. senator 1890, Dec. 12, and succeeded by Lieut. Gov. Willey); W. J. McConnell 1893-97; Frank Steunenberg 1897-1901; F. W. Hunt 1901-1903; J. T. Morrison 1903-5; 1905-1907; James H. Brady, 1907—.

Population.—Excluding uncivilized Indians (1870), 14,999; (1880) 32,610; (1890) 84,229; (1900) 161,772,

IDAHO SPRINGS, Col., town in Clear Creek co.; on the Colorado & S. railroad; about 30 miles w. of Denver. It is situated in the plateau region of the Rocky Mountains at an elevation of about 7,600 feet. Its cool temperature in summer, the magnificence of the scenery, and the hot and cold soda springs, all tend to make it a famous resort for health and pleasure seekers. In 1859, gold was discovered at Jackson's Bar, now a part of the town of Idaho Springs. This district has been most productive in its yield of gold. Some of the chief industrial establishments of the town are concentrating mills, lumber-yards, machine-shops, and wholesale stores in which are kept supplies for the miners. Pop. 2,600.

IDAHO, University of, the state university situated at Moscow. Work was begun in 1892; it is open to both men and women, and there is no tuition for residents of the state; a small fee is charged to non-residents. The government is by a board of regents; the courses offered include the classical course, general science, civil and mining engineering, and agriculture. The university is also active in organizing farmers' institutes. The annual income, derived mostly from state appropriations, is about $60,000; in 1906, the number of students was 375; the number of professors and instructors 32.

IDE, Henry Clay: an American jurist; b. in Barnet, Vt., 1844, Sep. 18; was graduated at Dartmouth College 1866; member of the Vermont State Senate 1882-85; president of the Republican State Convention 1884; delegate to the National Republican Convention 1888; appointed U. S. commissioner to Samoa 1891; was chief justice of the island, under joint appointment by Eng-

land, Germany, and the United States 1893-7; and was appointed a member of the Taft Commission to the Philippines 1900. In 1906, he was governor-general of the Philippine Islands.

-IDE, suff.: in *chem.*, a termination indicative of combination. It enters into the words oxide, fluoride, chloride, etc.

IDE, *īd* (*Leuciscus Idus*): fish of the family *Cyprinidæ*, of the same genus with the roach, dace, chub, etc. It is a native of the lakes of n. Europe, ascending rivers in April and May to spawn.

IDEA, n. *ī-dē'ă* (L. and Gr. *ĭdĕă*, look, appearance, an idea—from Gr. *eido*, I see: F. *idée*]: a notion; that which is seen or conceived by the mind; mental image. IDEAL, a. *ī-dē'ăl* [F. *idéal*—from L. *ĭdĕālĭs*]: existing in idea; mental; unreal. IDE'ALLY, ad. *-lĭ*, in idea. I'DEAL'ITY, n. *-ăl'ĭ-tĭ*, in *phren.*, one of the sentiments proper to man; also its organ on the skull; a lively imagination united to a love of the beautiful and perfect. IDEALIZE, v. *ī-dē'-ăl-īz*, to form ideas. IDE'ALI'ZING, imp. IDE'ALIZED, pp. *-īzd*. I'DEALIZATION, n. *-ăl-īzā'shŭn*. IDE'ALISM, n. *-ĭzm*, the doctrine which denies the existence of matter; or according to which the objects of the external world are what they are only through the action of the mind in which they exist as ideas. IDE'ALIST, n. one who holds the doctrine of idealism. THE IDEAL, a type or standard; an imaginary model of perfection; in *painting* and *sculpture*, that which goes beyond nature, yet is modelled upon it. BEAU IDEAL, *bō' ī'dē'ăl* [F. *beau*, beautiful; *idéal*, ideal]: that which unites in one form all the excellences found only in different individual forms.—SYN. of 'idea': notion; perception; conception; belief; doctrine; opinion; —of 'ideal': visionary; fanciful; intellectual; imaginary.

IDE'A: that which is imaged or conceived in the mind. This word has borne very distinct meanings in the history of philosophy. Till the 17th c., it generally had the signification given to it by Plato, and referred to the Platonic doctrine of eternal forms existing in the Divine mind, according to which forms the world and all sensible things were framed. Plato made a grand distinction between the *intelligible*, or what occupied the intellect, and the *sensible;* the intelligible represented the eternal, the immutable, and the certain; the sensible represented the mutable, and fleeting part of the universe. The forms preceded the matter; the actual circles occurring in nature were produced from a pre-existing ideal circle holding a place in the Divine intelligence; the actual men were generated from an ideal man. The word was used in this sense in literature as well as in philosophy till the 17th c., as in Spenser, Shakespeare, Hooker, and Milton. Thus in *Paradise Lost*—

> 'God saw his works were good,
> Answering his fair *idea*.'

Sir W. Hamilton dates the change in the application of

the word from the publication of Descartes's *Discourse on Method* 1637; remarking, however, that in a treatise by David Buchanan, published at Paris the year before, the new meaning had been introduced. 'The fortune of this word is curious. Employed by Plato to express the real forms of the intelligible world, in lofty contrast to the unreal images of the sensible, it was lowered by Descartes, who extended it to the objects of our consciousness in general. When, after Gassendi, the school of Condillac had analyzed our highest faculties into our lowest, the *idea* was still more deeply degraded from its high original. Like a fallen angel, it was relegated from the sphere of Divine intelligence to the atmosphere of human sense; till at last *Ideologie* (more correctly Idealogie), a word which could only *properly* suggest an *a priori* scheme, deducing our knowledge from the intellect, has in France become the name peculiarly distinctive of that philosophy of mind which exclusively derives our knowledge from the senses.'—Hamilton's *Discussions*, p. 70.

In speaking of the mental representation of external things, Descartes, instead of employing the various terms *image, species, phantasm*, etc., which had been the words formerly in use for that particular signification, used the word *idea*. In this he was followed by other philosophers, e.g., Locke, who states that he has adopted the word to stand for 'whatever is the object of the understanding, when a man thinks.' Thus the mental impression that we are supposed to have when thinking of the sun without seeing the actual object, is called our idea of the sun. The idea is thus in contrast with the sensation, or the feeling that we have when the sun is actually seen and our senses are engaged directly or immediately upon the thing itself. The sensation is what constitutes the *thing*, the reality: the impression persisting after the thing has gone, and recoverable by mental causes without the original, is the idea. Although the word in this application may be so guarded as to lead to no bad consequences, Dr. Reid was of opinion that it gave countenance to the setting up of a new and fictitious element in the operations of the mind. This, however, raises the great question of metaphysics—namely, the exact nature of our knowledge of an external world. See PERCEPTION.

It is difficult to avoid the use of the word idea, and yet, owing to the looseness of its application, there is danger of its not conveying a definite signification. We need a general word to express the contrast to sensation, or to actuality; and no better term has yet been found than idea, being what is common to memory and to imagination, and expressing the mind as not under the present impression of real objects, but as by its own tenacity and associating powers, imaging those objects to itself so that to all practical ends they are before its view. Thus, all our sensations, whether of sight, hearing, touch, taste, or smell, and all the feelings that we have

in the exercise of our moving energies, become transformed into ideas when, without the real presence of the original agency, we can deal with them in the way of pursuit or avoidance, or can discriminate and compare them, nearly as if in their first condition as sensation. A very large part of our thinking goes on in the form of *verbal* ideas, which, of course, do not in any sense reinstate the images of the *objects* to which they refer. Sir W. Hamilton, in his *Lectures on Logic* (i. 126), has endeavored to avoid employing the word, but other writers on mental philosophy have freely adopted it in the above acceptation. See also BERKELEY, GEORGE; GENERALIZATION; IMAGINATION; IDEAL-REALISM; NOMINALISM; PERCEPTION.

IDEAL: that which is opposed to the real. In philosophy the word is applied to any standard or norm toward which phenomena are supposed to approximate. For example, in ethics the ideal is applicable to those forms of conduct which are considered essentially good. In æsthetics the term is used to designate the conditions with which beauty must accord. It is also used in this connection to express the meaning, i.e., the idea, which a work of art is intended to convey. The opposition of the ideal to the real is oftentimes made in a misleading fashion, because the ideal itself is a genuine existence and deserves to rank as a particular form of reality. Indeed, in matters of conduct it is the ideal which ultimately determines what shall subsequently become (in the common use of the word) real. See IDEALISM.

IDEALISM: a term applied to any system of philosophy which conceives the fundamental reality to be of the nature of mind. Such systems are as a whole opposed to the materialistic, or naturalistic, views of life. Idealism is one of the oldest of the forms of philosophy and no period has wanted illustrations of it. In the Platonic system, which is often cited as typical of idealism in general, the world of common objects is thought of as made up of more or less perfect copies of archetypal ideas which are themselves the basic reality. Among the more important forms of modern idealism should be mentioned that of Berkeley (q.v.), that of Kant (q.v.), and that of Hegel (q.v.). Berkeley undertakes to show that what we call the world of matter is, in point of fact, reducible to subjective experience. He does not mean by this that the material world is unreal, but simply that its reality is mental and not something different from the mental. In Kant's view experience is undoubtedly conditioned by the organizing principles of the mind itself. We can perceive, for example, only under the conditioning circumstances of time and space, for these are *a priori* forms of the mind. The objects which we become aware of in this way constitute our phenomena. Behind these phenomena there is probably a world of things-in-themselves, but into this realm we can never penetrate.

In Hegel's system the universe itself is thought of as rational and all the great cosmical processes are viewed as stages on the road by which reality comes to consciousness of itself.

As metaphysics, idealism means that reality is at bottom mental or psychic in character. As epistemology, it means that knowledge is confined to ideas, and that we never get beyond sensations and ideas to the objects which possibly lie behind them. As ethics, it applies to those systems which, believing in human freedom, recognize the fundamental obligation to pursue ideals. In æsthetics, it means a view of beauty and of art in which the paramount duty is to incorporate the most perfect ideas in sensuous materials. Evidently, with this great variety of fields to which the term idealism is applicable, one can hardly look in it for any fixed and consistent meaning. See MATERIALISM.

IDEAL-REALISM, n.: in *phil.*, the teaching of an eclectic branch of the Kantian school, which attempted to build up a harmonious system without sacrificing Kant's realistic postulates to his idealistic teachings, or conversely giving up the latter in favor of the former. Schleiermacher, Ulrici, and Trendelenburg were of this section of Kantists.

IDEAT, n. *ī'dē-at*, or IDEATE, n. *ī'dē-at:* in *phil.*, the correlative or object of an idea; the real or actual existence correlating with an idea.

IDEATION: any mental process involving the use of ideas. A term applied in modern psychology to such mental acts as judging, reasoning, conceiving, imagining, etc.

IDEM, *ī'dĕm* [L.]: the same.

IDEM SONANS, *ī'dĕm sō'nanz:* term sometimes used in law, where a mistake as to a surname is made in a legal document, to denote that the name used by mistake was of a similar sound, in which case the mistake is usually treated as immaterial.

IDENTICAL, a. *ī-dĕn'tĭ-kăl* [F. *identique;* It. *identico,* identical—from mid. L. *identĭcus*—from L. *ĭdĕm,* the same]: the same; the self-same; not different. IDEN'TICALLY, ad. *-lĭ.* IDEN'TIFY, v. *-fī,* to unite or combine in interest, purpose, use, etc.; to become the same; to ascertain or prove to be really the same with something described or asserted. IDEN'TIFYING, imp. IDEN'TIFIED, pp. *-fīd.* IDEN'TIFICA'TION, n. *-fĭ-kā'shŭn,* the act of proving to be the same. IDEN'TITY, n. *-tĭ-tĭ* [F. *identité* —from mid. L. *identĭtātem*]: the state or quality of being the same; sameness, as distinguished from likeness and diversity. It must often be proved in legal proceedings, as in proving a marriage, proving a pedigree, proving a thief: the usual proof is the oath of some one who knew or was cognizant of the facts at both the times referred to.

IDEOGRAM, n. *ĭd'ĕ-ō-grăm* [Gr. *gramma*, a letter]: an idea represented by symbols, independent of sounds; a kind of hieroglyph expressing no sound but only an idea; a phonetic symbol; a letter. See HIEROGLYPHICS.

IDEOGRAPHIC, a. *ĭd'ĕ-ō-grăf'ĭk*, or ID'EOGRAPH'ICAL, a. *-ĭ-kăl* [Gr. *īdĕă*, an image or idea; *graphō*, I write]: denoting that way of writing which expresses the notion or idea and not the sound, as in figures, symbols, or hieroglyphics; expressing or representing ideas. ID'EOG'RAPHY, n. *-ŏg'ră-fĭ*, the expression or representation of ideas, as in shorthand-writing, symbols, etc. ID'EOGRAPHS, n. plu. *-grăfs*, notions or ideas expressed in symbols or hieroglyphs; hieroglyphs.

IDEOLOGY, n. *ī'dĕ-ŏl'ŏ-jĭ* [Gr. *īdĕă*, an idea; *logos*, speech, discourse]: the science of ideas or of mind; mental philosophy. ID'EOLOG'ICAL, a. *-lŏj'ĭ-kăl*, connected with or relating to the doctrine of ideas. ID'EOL'OGIST, n. *-jĭst*, one who treats of ideas.

IDEOLOGY, IDEOLOGUES: terms applied to the doctrines and their defenders of the French school of philosophy which followed upon and developed the sensationalism of the 18th c. Continuing the tradition borrowed from Locke, and introduced by Condillac, these men pursued the analysis of ideas and the inquiry into their origin as the only sure method of attaining philosophic doctrine of a scientific and reliable kind. Cabanis and Destutt de Tracy are exponents of the movement.

IDEO-MOTOR: a term applied to any action which ensues upon a conscious process of the ideational type. Acts which follow directly upon sensations are called sensory-motor. Many writers use the term ideo-motor to apply to sensory-motor cases, regardless of the distinction. Strictly speaking, all voluntary acts are ideo-motor, but the term is often confined to such cases as are better called non-voluntary, e.g., the movement of lip and throat muscles when one impulsively whistles or sings a melody which is "running in the head."

IDES, n. plu. *īdz* [L. *īdūs*, the Ides—from the Etruscan *ĭdŭō*, I divide: It. *idi*: F. *ides*]: in the *anc. Rom. calendar*, the 15th day of the months March, May, July, and October, and the 13th day of the other months: See CALENDS.

ID EST, phrase, *ĭd ĕst* [L.]: that is; frequently shortened into i.e.

IDIOCRASY, n. *ĭd'ĭ-ŏk'ră-sĭ* [Gr. *ĭdĭŏs*, peculiar to one's self; *krāsĭs*, mixture]: peculiarity of constitution—same as *idiosyncrasy*. ID'IOCRAT'IC, a. *-krăt'ĭk*, or ID'IOCRAT'ICAL, n. *-ĭ-kăl*, peculiar in constitution or temperament.

IDIOCY: non-development of the mental faculties; distinguished from the form of insanity called dementia which consists in the loss of mental powers formerly

possessed. The idiot has never become possessed of his mental faculties; his mind is a blank, or largely so: the demented person has lost a part—it may be almost all—of his mind; still he has vestiges of previously formed ideas. (See CRETINISM; IMBECILITY.) In certain cases of idiocy, the human form appears scarcely animated by intelligence at all; it is a senseless, motionless mass, to which the special senses impart no intimation of an external world, and from which there emanate no manifestations of human sentiments, or perception. The degrees of lack are, however, very numerous and sharply defined, so as to suggest different modes of management and training and different degrees of moral responsibility in the individuals. The general characteristics of the vast majority of idiots may be held to be diminutive stature, grotesque appearance, inactivity, uncleanly habits, gluttony, obtuse or acute sensibility, inability to regulate movements, to articulate, to count, degradation of propensities, and helplessness. The arrest of the evolution of intelligence, in whole or in part, may commence previous to birth, during infancy, and during childhood up to puberty. Among the prenatal causes of idiocy are instability of the nervous system, feeble-mindedness, alcoholism in one or both parents. Among the causes acting during infancy are injuries to the head, meningitis, scarlet fever or other of the acute infectious diseases of childhood, malnutrition from any cause, rickets, epilepsy, and cretinism. A large number of idiots are microcephalous, or have heads of very small dimensions; and though they usually die at an early age, they are apparently healthy.

The ameliorations which occasionally take place under judicious treatment, and the educability of a few individuals within a certain range, have suggested to physicians and philanthropists the propriety of attempting to rouse, direct, and apply such powers as may exist. The first attempt to give regular instruction to idiots was made in the *Bicêtre* at Paris many years ago. A magnificent training-school, now numbering about 600 inmates, has been some time in operation at Earlswood, Reigate, England; and there is a similar institution in Scotland. At the *Bicêtre*, near Paris, Dr. Edouard Seguin, at the suggestion of Itard, opened a school for idiots 1838. His system was based on the theory that idiocy was prolonged infancy. Shortly after 1848 he visited the United States; and later he settled in this country, and taught in various idiot institutions (see SEGUIN, EDOUARD). The success of idiot instruction is very variable in different classes of cases; but is on the whole much beyond what was deemed possible half a century ago.

IDIOM, n. *ĭd'ĭ-ŭm* [F. *idiome*, idiom, language—from Gr. *ĭdĭōmă*, peculiar phraseology—from *ĭdĭŏs*, peculiar to one's self: It. *idioma*, mode of speech]: a mode of expression or form of speech peculiar to a language or a

dialect; phraseology. IDIOMATIC, a. *ĭd'ĭ-ō-măt'ĭk*, peculiar to a language; phraseological; also ID'IOMAT'ICAL, a. *-ĭ-kăl*. ID'IOMAT'ICALLY, ad. *-lĭ*.

IDIOPATHIC, a. *ĭd'ĭ-ō-păth'ĭk* [Gr. *ĭdĭŏs*, peculiar; *pathos*, suffering]: not depending on any other disease; arising without any apparent exciting cause; opposite of *sympathetic*. ID'IOPATH'ICALLY, ad. *-ĭ-kăl-lĭ*. ID'IOP'ATHY, n. *-ŏp'ă-thĭ*, disease not dependent on any other disease.

IDIOREPULSIVE, a. *ĭd-ĭ-o-rē-pŭl'sĭv* [Gr. *idios*, peculiar to one's self: Eng. *repulsive*]: in *physics*, producing repulsion by its unaided action, as, the *idiorepulsive* action of heat.

IDIO-RETINAL LIGHT, *ĭd'ĭ-ō rĕt'ĭ-năl līt* [from Gr. *idios*, one's own, personal and retinal]: light belonging to one's own retina. Very faint clouds of light observed when all rays are shut off from the eyes either by covering the eyes or in a perfectly dark room. The effect is supposed to be caused by the blood in the retinal blood vessels stimulating the nervous mechanism of the eye.

IDIOSYNCRASY, n. *ĭd'ĭ-ō-sĭng'kră-sĭ* [Gr. *ĭdĭŏs*, peculiar to one's self; *sŭngkrāsis*, a mixing together]: a peculiarity of constitution or temperament of body in which certain articles of food or medicine generally produce effects different from those which usually occur: also the temperament of mind peculiar to an individual which affects his character and actions; constitutional antipathy. Thus, there are persons who have great dislike to particular food, smells, sounds, etc., which to most persons are agreeable; and, on the other hand, a desire is sometimes manifested for things generally disliked. In particular individuals, an eruption of the skin is caused by eating strawberries, or swooning by the smell of a rose, and that quite unconnected with any liking or disliking, or even with any knowledge of the cause. Idiosyncrasies also occur, in consequence of which certain medicines are either inoperative, or certain poisons harmless. Idiosyncrasies are either permanent or temporary, sometimes arising from mere morbid conditions, and disappearing with them. The term is applied to *mental* as well as *physical* peculiarities. ID'IOSYNCRAT'IC, a. *-krăt'ĭk*, or ID'IOSYNCRAT'ICAL, a. *-ĭ-kăl*, of peculiar temperament of body or mind.

IDIOT, n. *ĭd'ĭ-ŏt* [F. *idiot*—from L. *ĭdĭōtă*, an uneducated, ignorant person—from Gr. *ĭdĭōtēs*, a private individual—from *ĭdĭŏs*, proper, peculiar to one's self: It. *idiota*, an ignorant, common person—*lit.*, a private person]: a human being defective in his mental and moral powers; a natural fool; a very foolish person. ID'IOCY, n. *-ŏ-sĭ*, state of being an idiot; extreme imbecility, in which reason has been wholly undeveloped, or but partially developed; also ID'IOTCY, n. *-ŏt-sĭ*. ID'IOT'IC, a. *-ĭk*, like an idiot; also ID'IOT'ICAL, a. *-ĭ-kăl*. ID'IOT'ICALLY, ad. *-lĭ*. ID'IOTISM, n. *-ĭzm*, natural imbecility of mind.

IDIOTHALAMEÆ, n. *ĭd-ĭ-o'tha-lăm'ē-ē* [Gr. *idios,* one's own; *thalamos,* an inner room]: tribe of lichens, having shields first close, and then open, and the nucleus gelatinous, made up of naked spores.

IDIOTYPE, n. *ĭd'ĭ-o-tīp* [Gr. *idios,* peculiar; Eng. *type*]: in *chem.,* term applied to bodies derived by replacement from the same substance, including the typical substance itself. Ammonia is idiotypic with ethylamine and all other organic bases derived from it by substitution.

IDLE, a. *ī'dl* [Ger. *eitel:* Dut. *ijdel,* vain, trifling: Sw. *idel,* mere, downright]: vain; unimportant; not employed; averse to labor; useless; frivolous; unprofitable: V. to lose or spend time; in *OE.,* to play lightly. I'DLING, imp. IDLED, pp. *ī'dld.* IDLER, n. *ī'dlėr,* one who; in *mach.,* a cog-wheel placed between two others to communicate the motion of one to the other; in *naut.,* a person on board ship who, being liable to constant day-duty, is not required to keep night watch. IDLY, ad. *ī'dlĭ,* in an idle manner; vainly. I'DLENESS, n. *-dl-nĕs,* the state of being unemployed; sloth; omission of business; the state of lying useless or unemployed. TO IDLE AWAY, to spend or waste in idleness. IDLE-HEAD'ED, or -PA'TED, exceedingly stupid. IDLESS, or IDLESSE, n. *-ī'dl-ĕs,* poetical for *idleness.*—SYN. of 'idle, a.': lazy; indolent; unoccupied; unemployed; inactive; vacant; sluggish; slothful; futile; useless; trifling; vain; unimportant; ineffectual; barren; —of 'idleness': indolence; sluggishness; inaction; laziness.

IDLE, *ī'dl:* town in the W. Riding of Yorkshire, England; near the river Aire, 9 m. n.w. of Leeds. Woolen cloth is the staple manufacture. Pop. (including Windhill) 12,036.

IDOCRASE, n. *ĭd'ō-krās* [Gr. *eidos,* form; *krasis,* a mixture]: a mineral, a variety of garnet, so termed from its crystalline forms being mixed figures; vesuvianite. See VESUVIAN.

IDOL, n. *ī'dŏl* [F. *idole,* an idol—from L. *īdōlŏn;* Gr. *eidōlŏn,* an image, a form: It. *idolo*]: an image employed as an object of worship; any person or thing loved beyond measure: a term used by Bacon to denote a fallacy of the mind. IDOL'ATER, n. *-dŏl'ă-tėr,* one who worships idols or images. IDOL'ATRESS, n. *-trĕs,* a woman who worships images. IDOL'ATROUS, n. *-trŭs,* tending to or comprising idolatry. IDOL'ATROUSLY, ad. *-lĭ.* IDOL'ATRY, n. *-ă-trĭ* [F. *idolâtrie*—from mid. L. *idōlātrĭă*—from Gr. *eidōlŏn,* an image; *latreia,* service]: the worship of images; love bordering on adoration. IDOLIZE, v. *ī'dŏl-īz,* to love to excess. I'DOLI'ZING, imp. I'DOLIZED, pp. *-īzd.* I'DOLI'ZER, n. *-zėr,* one who idolizes or loves to excess. IDOLISM, n. *ī'dŏl-ĭzm,* idolatrous worship.

IDOL'ATRY: act of worshipping an image supposed to be, or intended to represent, a divinity. Although the first principles of reason suggest to man's mind the idea of one Supreme Being, the source of all existing things,

and the origin of all good (see GOD), yet the very earliest historical records, sacred and profane, teem with evidences of the errors into which men quickly fell through ignorance and passion, changing 'the glory of the uncorruptible God into an image made like to corruptible man, and to birds, and four-footed beasts, and creeping things' (Rom. i. 23). To these images, as well as to the images of inanimate objects, or of the ideal powers or forces supposed to be embodied in such objects—as the sun, the moon, the stars, air, water, fire, and other natural elements—divine honors were paid by most of the ancient nations; to which honors the name idolatry has been given. Hence, as each of these corrupt worships had its own peculiar symbols, the idolatry of the ancient Gentile religions may be reduced to four classes: (1) The idolatry of nature-worship, which was of two kinds —the first of inorganic nature, which consisted chiefly in *Litholatry*, or the worship of stones or pillars, mentioned Lev. xxvi., and Num. xxxiii. 52, the second of organic nature, or of the powers of nature, as *Dendrolatry*, or the worship of trees—under which form were symbolized the productive or generative powers of nature, and to which the most modern investigators of Phœnician antiquities trace the origin, as well of the grossly immoral worship of the *Ashtaroth* of the Phœnicians, as of the phallic worship, which found its way, under various forms, through all the kindred races, both in the West and in the East. (2) The idolatry of animal-worship, which we find as well in the (perhaps originally symbolical) worship of the sacred oxen, the crocodiles, and serpents among the Egyptians, as in that of the still more degrading forms of animal life which constituted the object of adoration with other nations. (3) A higher form of idolatry which prevailed among the races of Chaldean origin, *Astrolatry*, or star-worship, often designated by the name *Sabæism*. There was one form of Sabæism which cannot strictly be called idolatry, as it did not involve the use of idols, but addressed itself directly either to the heavenly bodies themselves, or to the element of fire, with which they were associated. But the same object of religious worship, coupled with the use of idolatrous representations, is found in the worship of Baal, of Moloch, and of Tammuz, the Phœnician Adonis (Ezek. viii. 14). (4) The form of idolatry which prevailed in the later period of the ancient Gentile religions, *Anthropolatry*, or the worship of representations of the human form. It is familiar to us chiefly through the mythology of Greece and Rome, but it found place also in most of the other religious systems, in some of which the representations of the human form were variously modified to symbolize those special attributes which formed the peculiar objects of the worshippers' adoration. Of this there are many examples in the mythological representations of the Egyptians and of the

Indians. In the Egyptian religion, indeed, and in the later Grecian, many of the idols were representations of pure abstractions, as of certain faculties or affections of the mind, of virtuous desires, or of evil passions. Nor can it be doubted, that among the more cultivated classes, there were individuals by whom these abstractions were understood, and by whom the crude idolatry of the multitude was regarded solely as a device adapted to their more gross and material conceptions. See IMAGE-WORSHIP.

The Jews, notwithstanding the many safeguards by which the belief of the one Living God, Jehovah, was protected in their religious system, were frequently seduced into the idolatrous worship of the Gentile nations among which they were thrown. It is one of the most remarkable among the anomalies of the history of this singular people, that the great and radical purification of their faith in the unity of God dates from their protracted Babylonian captivity; from which time the worship of the One God, Jehovah, was maintained, notwithstanding the effort of Antiochus Epiphanes to introduce the Greek idolatry (I Macch. i.), until the coming of the Lord Jesus. The idolatry into which the Jews fell at different periods was chiefly of the first and the third forms described above.

The idolatry of the savage tribes of the African and Oceanican races is mostly of the class known as FETICHISM. See FETICH.

IDOTHEA, n. *ī-do-thē'a:* in *zool.*, typical genus of the *Idotheidæ*, a family of cursorial isopoda.

IDRIA, *ĭd'rĭ-a* or *ē'drē-â:* small but important town of Austria, in the crownland of Carniola, celebrated for its quicksilver mines (discovered 1497). It is in a deep, caldron-shaped valley, on the river Idria, 22 m. w.s.w. of Laibach. The descent to the mines is by 787 steps, hewn in the rock, and is easy, and free from danger. The mines are said to be the richest in Europe. More than 330 tons of quicksilver are produced here annually, and about 60 tons of cinnabar (red sulphuret of mercury). Besides mining, the manufacture of linen and silk fabrics and bone-lace, and distilling spirits, gives employment to the people. Pop. 4,174.

IDRIALINE, n. *ĭd'rĭ-ă-lĭn:* one of the mineral resins, so named from its being found at *Idria*, in Carniola.

IDRI'SI, or ADRI'SI. See EDRISI.

IDUME'A. See EDOM.

IDUN, *ē-dôn'* or IDUNA, *ē-dô'nâ:* goddess of the northern mythology; daughter of the dwarf Svald; but being received among the Æsir, she became the wife of Bragi. Idun possessed a precious apple, by the use of which the gods preserved their perpetual youth. She was carried off by the giant Thiassi, with the assistance of Loki; but the gods sent Loki after her, to bring her back, which he

did, after changing himself into a falcon, and Idun into a nut.

IDYL, or IDYLL, n. *ī'dĭl* or *ĭd'ĭl* [L. *idyllĭŭm*—from Gr. *eidŭl'lĭŏn*, a pastoral poem—from *eidŏmai*, I appear, I seem]: short descriptive poem, usually pastoral; a poem of romance and fancy. Though the idyl commonly represents the simple scenes of pastoral life, it is not exclusively pastoral, in the usage of either the ancients or the moderns. Of the 30 *Eidyllia* of Theocritus, not more than half are pastoral. After the use made of the word by Tennyson, in his *Idylls of the King*, which are epic in their style and treatment, and romantic and tragic in their incidents, it becomes difficult to say what poem is not an idyll. IDYL'LIC, a. *-lĭk*, of or pertaining to idyls.

IE'SI. See JESI.

IF, conj. *ĭf* [AS. *gif;* Dut. *of*, if, but: Icel. *ef*, if; *efa*, or *ifa*, to doubt]: a word which introduces a conditional clause; supposing; provided; whether or not.

IFURIN: in the *Celtic mythology*, the infernal region; terrible with dragons, serpents, and an atmosphere of poison; the abode of the vile, in the belief of the ancient Gauls.

IG, *ĭg:* another form of the prefix IN, signifying *not*. See IN.

IGASURIC ACID, *ĭg'ă-sū'rĭk ăs'ĭd* [Mal. *igăsūră*, a vomiting nut]: an acid found in nux vomica and Ignatius' bean. IGASURINE, very poisonous alkaloid, found 1853 in the mother-liquors from which strychnine and brucine had been precipitated by lime.

IGLAU, *ē'glow* or *ĭg'low*, or JIHLAVA: very old walled town of Austria, province of Moravia, on the river Iglawa, close to the Bohemian boundary, 49 m. w.n.w. of Brünn. It consists of the town proper and of three suburbs. Its trade, especially with Poland, is important. Several very productive silver-works are in operation here. Pop. 23,716.

IGLESIAS, *ē-glā'sē-âs:* walled city of Sardinia, province of Cagliari; 32 m. w.n.w. of Cagliari city. It is in a very fertile region, and its vicinity abounds in rich silver and lead mines. Because of its mines, large number of churches, and beautiful suburban gardens, it is variously known among Sardinians as the 'city of the mines,' 'city of the churches,' and 'flower of the world.' Its chief industries are the manufacture of woolen and linen fabrics by women. Pop. 12,094.

IGLESIAS, JOSÉ MARIA: statesman: b. Mexico City, 1823, Jan. 5. He was educated in the Univ. of Mexico, admitted to the bar 1844, appointed prof. of jurisprudence 1845, entered political life 1846, was an official of the supreme tribunal of war and milit. judge for the army of the East during the Mexican war, elected member of congress 1852, appointed chief of the bureau of public credit 1855, minister of justice 1857, supported the

govt. during the French occupation, minister of the treas., justice, and the interior, under Pres. Juarez; elected chief-justice of the supreme court 1873, declared the re-election of Pres. Lerdo illegal, and by virtue of his office claimed the provisional presidency, installed his govt. at Guadalajara 1877, Jan. 2; was defeated by Gen. Diaz, removed to the United States 1877, Jan. 17, returned to Mexico 1878, and has since applied himself to editorial and literary work.

IGLOO, n. *ĭg'lô* [Esquimaux]: a hut, usually circular, made of snow; an excavation made by a seal in the snow over its breathing-hole, for the protection of its young.

IGLOOLIK, *ĭg-lô'lĭk:* island of some historical interest, near the e. end of the Strait of the Fury and Hecla, lat. 69° 21′ n., and long. 81° 53′ w. It was named after an intelligent Esquimaux woman, Parry's guide and pilot on his second voyage; and here that navigator passed the winter of 1822-3, from Oct. 30 to Aug. 12. During this time, the temperature ranged between —45° and 59° F., a mean of 7° above zero.

IGNATIA AMARA, *ĭg-nā'shĭ-ă ăm-ā'ră* [*St. Ignatius; amārus,* bitter]: St. Ignatius' bean: called also STRYCHNOS IGNATIA. See IGNATIUS' (ST.) BEAN.

IGNATIEFF, *ĭg-nâ'tē-ĕf,* NICOLAS PAULOVITCH: soldier and statesman; b. St. Petersburg 1832, Jan. 29. He was educated in the Imperial Corps des Pages, entered the Imperial Guard 1849, served through the Crimean war, and the Poland insurrections, was milit. sec. to the Russian embassy at London, won imperial favor by a detailed report on the position of Great Britain in India, was sent on a diplomatic mission to Khiva and Bokhara, appointed ambassador to Pekin 1860 and Constantinople 1864, was minister of the interior 1878-82, re-appointed 1889, May. He opposed the policy of the late Prince Gortschakoff. He married the wealthy Princess Galitzin.

IGNATIUS, *ĭg-nā'shĭ-ŭs,* SAINT: Bishop of Antioch, at a date uncertain, but after A.D. 69; d. 107 (or 116): said to have been a disciple of the apostle John, and reckoned one of the apostolical Fathers. The chronology of the bishopric of Antioch is not known: some make Ignatius the second, others the third bishop. Equally uncertain is the date of the writings ascribed to him. He bore the surname *Theophoros*—i.e., one who carries God [or as Ignatius explained it, 'Christ'] in his heart; or, again, as some (Jerome among them) wrongly supposed, 'one who was carried by God'—i.e., by Christ, referring to the legend, utterly worthless, that he was the little child referred to, Mk. ix. 36. Ignatius was a true shepherd of his people, one of those meek, earnest, loving spirits to whose unobtrusive piety Christianity owed its first and best triumphs. Domitian's persecution of the church of Antioch proved his courage, and in the second and fiercer persecution of Trajan, Ignatius was

sacrificed for his flock. A story of his interview with Trajan has come down to us. That strong ruler, full of worldly sagacity, just after his pagan fashion, could not understand a man so utterly unworldly as Ignatius. He contemptuously called him a *kakodaimon* (one having an evil genius or demon), and in the end condemned him 'to be led as a prisoner to Rome, there to be made the food of wild beasts for the amusement [*ad delectationem*] of the people.' In the Church of Rome, his martyrdom is commemorated Feb. 1; in the Greek Church Dec. 20.

The genuineness of the writings (a Liturgy, and a little work entitled *Didaché*, quoted by Chrysostom) of the epistles ascribed to him—of which 15 (12 in Greek and 3 in Latin) are extant—some of which are quoted in the 2d, 3d, and 4th c., and were widely read in the ancient church—has been much disputed since the 16th c. The common opinion of scholars (until perhaps the last 30 years) was in favor of the genuineness of seven of the Greek epistles, which are extant in two redactions of different length, and in two corresponding ancient Latin translations—those to the Ephesians, Magnesians, Philadelphians, Trallians, Smyrnæans, Romans, and to Polycarp, his contemporary; but even these were regarded as spurious by Daillé, Semler, Hermann, Ernesti, and others, with whom in the main Neander concurs. The controversy received a new impetus by the publication of Bunsen's *Ignatius und seine Zeit* (Hamb. 1847), in which that writer endeavored to establish the genuineness of three of the seven epistles, and the superiousness of the others; his conclusions were, however, assailed by the great leader of the Tübingen school, F. C. Baur, in his *Die Ignatianischen Briefe und ihr neuester Kritiker* (Tüb. 1848). The most probable view of the seven epistles is that which conceives them to have a basis of genuineness, but to have suffered extensive interpolation. The reason why these epistles have excited so keen an interest among ecclesiastics, is, that the question of church government is dealt with in them; they are, in fact, a battle-ground between advocates of prelatical (Rom. Cath. and Episc.) and non-prelatical (Congl. and Presb.) views; and as they seem to favor the hierarchical system of the former, prelatists have, as a rule, been strenuous in defense of their Ignatian origin, while non-prelatists have as warmly attacked it. The discovery, in an Egyptian convent, of a Syriac version (S) of three of the epistles—those to the Romans, the Ephesians, and to Polycarp (pub. by the Rev. W. Cureton, formerly of the British Museum, under the title *The Ancient Syriac Version of the Epistles of St. Ignatius*, etc., Lond. 1845; and, still better, *Corpus Ignatianum*, Berlin 1849), on account of what were considered the higher claims of the Syriac to be considered genuine than any Greek MSS., led to the opinion that the common Greek text has been very seriously tampered with—the interpolations consisting

often of passages enforcing episcopal authority, and asserting the deity of Jesus Christ. This opinion that the Greek text has been changed may be true; but the latest judgment of scholars is that the Syriac (S) is nothing more than an extract from G^1 (the short Greek version). It is still a question whether the epistles extant under the name of Ignatius are genuine or spurious. It is pointed out, however, that though the epistles extol the bishop, and draw sharp distinction between the episcopal and the presbyterial office in the church, they give no hint of an establishment of the episcopate by the apostles; they do not connect with it those ideas of a priesthood which abound in later writers; and they treat it as an office in the congregation or local church rather than in the church general.

The text of the writings ascribed to Ignatius is in the various editions of the Apostolic Fathers, from that of Cotelerius (2d ed. 1724) to the recent and admirable one edited by Gebhardt, Harnack, and Zahn (1876). There are English translations by Archbishop Wake and in the *Ante-Nicene Library* (Clark, Edin.). Consult Zahn, *Ignatius von Antiochien* (1873).

IGNA'TIUS' (St.) BEAN: seed of the *Ignatia amara*, formerly *Strychnos Ignatii*, tree of nat. ord. *Loganiaceæ*, nearly allied to that which produces *Nux vomica* (q.v.); native of Cochin-China and of the Philippine Islands. The fruit is of the size of a large pear, and contains about 20 brownish seeds, about the size of olives, rounded on one side, somewhat angular on the other. These seeds were brought into the Dutch shops under their present name about the end of the 17th c., but there is some reason to think that they are the *nux vomica* of earlier writers. They contain *strychnia*, and their medicinal uses are similar to those of *nux vomica*.

IGNA'TIUS DE LOYO'LA, Saint. See Loyola.

IGNEOUS, a. *ĭg'nĭ-ŭs* [L. *igněŭs*, burning—from *ignis*, fire: It. *igneo;* F. *igné*, igneous]: containing fire; consisting of fire; produced by fire; resulting from the action of fire, as igneous rocks.

IGNEOUS ROCKS: those which have been produced from materials fused by heat. They differ from the sedimentary rocks in origin, structure, and position. They invariably come from below upward, breaking through the older rocks. The materials of sedimentary strata are fragments of pre-existing rocks, worn, by the action of water, either into a fine mud or into rounded particles, of greater or less size; whereas igneous rocks exhibit either a vitreous structure, as when they have been quickly cooled; or a granular structure, composed of more or less minute crystals, according to the rate of cooling; or a vesicular structure, when they have been expanded by the contained gases, or by being brought into contact with water. Some rocks are erroneously

called igneous, whose materials, though originally obtained from volcanoes or other subterranean source, have yet been ultimately arranged by water, like the materials of Grahame's Island (q.v.). When this fact receives due consideration, many igneous rocks whose position is now a puzzle, will be better understood. Some of the rocks composing Arthur's Seat, near Edinburgh, are undoubtedly of this character, and before a right theory of the hill can be constructed, these must be separated from the truly igneous rocks. In position, also, the igneous may be distinguished from the sedimentary rocks, for they seldom occur regularly stratified, with a parallel upper and under surface, but are generally local, thinning into wedge-shaped beds, or having that irregular stratification seen in modern lava. They occur also as upright walls or dikes, filling up cracks in the sedimentary strata.

The most satisfactory classification of the igneous rocks is based on their age. The three divisions thus established are characterized each by peculiar mineral and structural differences. The oldest or Granitic series (see GRANITE) are generally associated with the Paleozoic strata, but are sparingly found in the Secondary, and even in the Tertiary formations. The special peculiarity of the granitic rocks is the great abundance of silica in them; it forms not only a considerable amount of the constituents of the hornblende and felspar, but crystallizes free in the rock-mass as rock crystal. The Trappean Rocks are associated with the Paleozoic and Secondary strata, and are composed of crystals of felspar and hornblende, varying in character according to the predominance of the one or other of these ingredients. The Volcanic are the newest igneous rocks; they belong to the present period, or the Tertiary strata. The chemical ingredients are the same as those that constitute the Trappean rocks; but they are somewhat differently built up, augite being the peculiar form which the silicate of magnesia and lime assumes in the newer rocks, while it appears as hornblende in the older or Trappean series.

IGNIS-FATUUS, n. *ĭg-nĭs-făt'ū-ŭs* [L. *ignis,* fire; *fatūŭs,* foolish]: luminous meteor sometimes seen flitting about in the air a little above the surface of the earth, chiefly in marshy places or near stagnant waters—familiarly called *Jack-with-a-lantern,* and *Will-with-a-wisp,* or *Will-o'-the-wisp;* hence something fanciful, unreal, or unattainable, a utopian scheme. The Ignis-Fatuus has puzzled philosophers from the time of Aristotle. It generally appears a little after sunset, as a pale bluish-colored flame, varying in size and shape; sometimes it shines steadily till morning, at other times disappears, and reappears within about half-hourly intervals. It floats in air about two ft. from the ground, is sometimes fixed, and sometimes moves with great rapidity. In general, it recedes on being approached, and *vice versâ,* though several successful attempts have been made to

light a piece of paper by it. Many efforts have been made to discover its cause; but so varied are its appearances, and so void of any common principle, that these attempts have failed. Of the various theories advanced only two need be mentioned. The first is, that the Ignis-Fatuus is due to *phosphuretted hydrogen gas* (PH_3), in which is generally present some portion of the phosphorous compound which possesses the power of spontaneous ignition on coming in contact with dry atmospheric air; the gas would be generated by the decomposition of animal matter present in a marshy soil. The motion of the Ignis-Fatuus is accounted for by the flame being communicated along the line of a stream of the gas. The second is, that it is due to the combustion of *light carburetted hydrogen gas, methane* or *marsh gas* (CH_4), arising from the decomposition of vegetable matter; but though this supposition satisfactorily accounts for many appearances connected with the Ignis-Fatuus, the gas itself is not spontaneously combustible, and an additional supposition requires to be made to account for its ignition. The probable conclusion is, that a number of phenomena similar to the eye, but arising from different causes, are aggregated under the term Ignis-Fatuus. *The Ignis-Fatuus, however, has never been produced artificially.* Electricity and phosphorescence can produce the luminous appearance, but as far as our present knowledge enables us to judge, they are unable further to imitate it.

It is not a common phenomenon, many distinguished naturalists never having seen it; but it is frequently seen in n. Germany, in the swampy and moorland districts in s. and n.w. England, and in the Lowlands of Scotland. It is seen in the above places from the middle of autumn till the beginning of November. In former times, the Ignis-Fatuus, under the names of *Will-o'-the-wisp, Jack-a-lantern, Spunkie,* etc., was an object of superstition among the uneducated, and was believed due to the agency of evil spirits attempting to lure the traveller to his destruction, and, indeed, there have been instances of travellers mistaking it for a lamp or lantern and being thus decoyed into marshy places, where they perished.

IGNITE, v. *ĭg-nīt'* [L. *ignītŭs,* fiery, glowing—from *ignis;* Skr. *agni,* fire; It. *ignito,* ignited]: to kindle; to render red or luminous by heat; to take fire. IGNI'TING, imp. IGNI'TED, pp. IGNI'TIBLE, a. *-tĭ-bl,* capable of taking fire. IGNITION, n. *ĭg-nĭsh'ŭn* [F.—L.]: the act of setting on fire; the state of being kindled; differing from *combustion,* which is a consequence of ignition.

IGNOBLE, a. *ĭg-nō'bl* [F. *ignoble*—from L. *ignōbĭlĭs,* unknown—from *in,* not; *nōbĭlĭs,* well-known, noble: It. *ignobile*]: *literally,* of low birth or family; worthless; base; low, mean, or base, as in thoughts, words or ac-

tions. IGNO'BLY, ad. *-blĭ.* IGNO'BLENESS, n. *-bl-nĕs,* meanness; want of dignity.—SYN. of 'ignoble': dishonorable; scandalous; infamous; degenerate; degraded; disgraceful; reproachful; shameful.

IGNOMINIOUS, a. *ĭg'nō-mĭn'ĭ-ŭs* [L. *ignōmĭn'ĭă,* discredit, reproach—from *in,* not; *nōmĕn,* a name: It. *ignominia;* F. *ignominie,* ignominy]: incurring or inflicting disgrace or shame; mean; dishonorable; shameful. IG'NOMIN'IOUSLY, ad. *-lĭ.* IGNOMINY, n. *ĭg'nō-mĭn-ĭ,* public disgrace, as on account of dishonorable motives or conduct; shame; infamy; dishonor. IGNOMY, n. *ĭg'nō-mĭ, OE.,* for ignominy.—SYN. of 'ignominy': opprobrium; reproach; contempt.

IGNORAMUS, n. *ĭg'nō-rā'mŭs* [L. *ignōrāmus,* we know not, we ignore—the word formerly written by a grand jury on a bill of indictment, when there was not sufficient evidence to find a true bill—hence to *ignore*]: ignorant person; vain pretender to knowledge. IG'NORA'MUSES, n. plu. *-mŭs-ĕz.* The words now used on a bill are 'Not a true bill,' or 'Not found.'

IGNORANCE, n. *ĭg'nō-răns* [F. *ignorance*—from L. *ignōran'tĭă,* ignorance—from *ignōrans,* not knowing: It. *ignorante:* F. *ignorant,* ignorant]: the want or absence of knowledge. IG'NORANCES, n. plu. *-răns-ĕz,* in *B. of Com. Prayer,* sins committed in or through ignorance. IG'NORANT, a. *-rănt* [F.]: without knowledge or information; uninstructed; illiterate; without knowledge of some particular; unacquainted with. IG'NORANTLY, ad. *-lĭ.* THE IGNORANT, those untaught or uneducated; the unlettered.—SYN. of 'ignorant': illiterate; unlearned; unlettered; uninstructed; untaught; unenlightened; uninformed; unacquainted; unconscious; unaware; unknown; undiscovered.

IGNORANCE OF THE LAW (IGNORAN'TIA JU'RIS): held in law to be no excuse for any breach of contract or duty, nor for crime or other offense. It is absolutely necessary to start with this maxim, otherwise it would be quite impossible to administer the law, for if once a contrary maxim were allowed, it would not only be a premium to ignorance, but would lead to endless and abortive inquiries into the interior of a man's mind. Ignorance of a *fact,* however, is a different thing. Another kindred maxim of the law is, that every man intends the consequences of his own act; thus, if he shoot at or give poison to a person, it is presumed that he intended to kill such person. So, if he leave a trap-door open in a street or thoroughfare, it is held that he intended people to fall into it and be injured. There is, however, a doctrine called *bona fides,* which in the case of petty offenses punishable by justices, often tempers the strict and rigid application of the maxim, *ignorantia juris neminem excusat* (See BONA FIDES, in Law); and even in crimes a judge always takes into consideration, when

passing judgment, whether the prisoner or defendant was an ignorant or an intelligent person.

IGNORANTINES, *ĭg-nō-răn'tĭnz* [Fr. *Frères Ignorantins*]: religious congregation of men in the Rom. Cath. Church, associated for gratuitous instruction of poor children in sacred as well as secular learning. It is usually but incorrectly called, *Brethren of the Christian Schools.* It was founded in Rheims, France, 1679; formally organized 1683 by the priest Jean-Baptiste de la Salle; approved by Pope Benedict XIII. 1725; and has gradually been introduced into every Rom. Cath. country of Europe. In France, this congregation shared at the Revolution the fate of all the other religious bodies; but the brethren were recalled, and re-established under Napoleon 1803; and were recognized by govt. 1808. They are now exceedingly numerous in France, Italy, and Germany, and have many branches in England and Ireland, and in parts of America. In Ireland they possess, especially in Dublin, Cork, Limerick, Waterford, large educational establishments; and they have published for the use of their schools a series of school-books, designed to combine with secular knowledge information on the subject of religion, specially for Rom. Cath. pupils. See BROTHERS OF THE CHRISTIAN SCHOOLS.

IGNORATIO ELENCHI, a term in logic employed to designate chains of reasoning in which the conclusions reached, even if in themselves correct, are not based upon the premises from which the argument set out. Appeals to popular prejudice are commonly couched in this form.

IGNORE, v. *ĭg-nōr'* [F. *ignorer,* to ignore, to be ignorant of—from L. *ignōrārĕ,* to have no knowledge of]: to set aside or reject; to pass over or overlook purposely. IGNOR'ING, imp. IGNORED', pp. *-nōrd'*. See IGNORAMUS.

IGUALADA, *ē-gwâ-lâ'thâ:* town of Spain, in the modern province of Barcelona, about 40 m. w.n.w. of the city of Barcelona, on a rising ground on the left bank of the river Noya. It is for the most part closely built, dark, and dirty; carries on manufactures of cotton and woolen goods, hats, and firearms, and is the seat of considerable trade. Pop. abt. 12,000.

IGUANA, n. *ĭg-wâ'nă* [Sp. *iguana*—from a native St. Domingo word, *igōână*]: genus of saurian reptiles, type of the family *Iguanidæ* (*ĭg-wăn'ī-dē*), a family which contains abt. 60 known genera, and many species, and to which belong some of the largest saurians now existing except those of the crocodile family. Far larger saurians allied to them existed in former geological periods: see IGUANODON. The *Iguanidæ* have a lizard-like form and a long tail. The tongue is thick, fleshy, not extensile, and is notched at the tip. They have rows of small teeth on the palate, and their jaw-teeth are remarkable both for their form and for their mode of insertion, not being

lodged in distinct sockets, but fixed in a kind of furrow along the internal face of the jaw-bone, adhering by one side of the bony surface of the root. The food of the *Iguanidæ* consists chiefly of leaves and fruits. They are all natives of warm climates.—In the genus Iguana, the back exhibits a row of elevated, compressed, pointed scales along its whole length, continued to the extremity of the tail; while under the throat is a great dewlap-like pouch. The feet have long toes, not webbed, with sharp claws, well adapted for climbing trees, while the compressed tail is the organ of progression used in swimming. The COMMON IGUANA, or GUANA, is abundant in the W. Indies and tropical America, living mostly among trees. It attains a length of four or five ft. It is of greenish-yellow color, mottled with green, the tail ringed with brown. It is esteemed a delicate article of food, and is used by all classes of people. It is often caught by means of a noose thrown over its head; dogs have also been trained to hunt it on some of the W. India *keys*, where it has not opportunity of taking refuge in trees. The eggs—about the size of those of a pigeon, but with no hard shell, and laid in the sand—are eaten, and are good food. Other species of Iguana and nearly allied genera are eaten in tropical America, as the Horned Iguana (*I. cornuta* or *Metapoceros cornutus*) of Hayti. The true iguanas all are American.

IGUANODON, n. *ĭg-wăn′ō-dŏn* (Sp. *iguana*, Gr. *odous* or *odonta*, tooth]: genus of remarkable gigantic dinosaurian reptiles, more abundant in the Wealden beds of Kent, Sussex, England, and the Isle of Wight, than any other genus of associated saurians. Their form was probably lizard-like. Their singular structure, differing in many important particulars from any known reptile, long caused great diversity of opinion as tc their true position. Dr. Mantell, their original discoverer and learned expounder, first knew of their existence from some enormouse bones which, notwithstanding their colossal size, he considered reptilian. A large tooth next turned up. whose smooth-worn crown attested its having belonged to a herbivorous animal. Numerous other specimens of teeth were after a time discovered, and Dr. Mantell found that they corresponded in a remarkable manner with the teeth of the small American lizard, the iguana, though with striking and important differences. The first guesses as to the creature's size, founded on fragmentary materials, varied vastly: Mantell suggesting a length of 50 to 60 ft., Owen of 28. An extraordinary recent 'find' of iguanodons has simplified this and other questions as to the structure. In 1878, there were found at Bernissart, in Belgium, between Mons and Tournai, the remains of about 23 specimens, belonging to two well-marked species; only two other species having till then been proposed. In the complete skeleton set up at Brussels from these materials, the height is 14 ft. 2

inches; the horizontal length of the body in a half-standing attitude, 23 ft. See *Nature* XXVIII.

The structure of the skeleton is very remarkable. The front parts of both upper and lower jaws were without teeth, and suggest a hollow, beak-like arrangement; possibly the creature had a long prehensile tongue. In many respects there are striking resemblances between the structure of the ornithopod Dinosaurians (of which the *Iguanodontidæ* are a family) and that of birds. The vertebral column had joints slightly concave on both surfaces, yet had lofty neural arches; and the sacrum was composed of five anchylosed joints, a structure found in no other reptile. The two forelegs were small; the hinder limbs were long and strong, raising the body some distance from the ground.

The leg terminated in a three-toed foot, which produced the enormous tridactyle impressions on the argillaceous Wealden beds that were for some time considered the footprints of huge birds. The Iguanodon is supposed to have walked at times on its hind legs, like a bird.

The teeth of the Iguanodon, while bearing a general resemblance to those of the iguana, were much more complicated both in external form and internal structure than in any other known reptile. In all other known reptiles, the vertically flat teeth are always sharp edged, and fitted only to cut off the plants on which they feed, but the worn crowns in this animal show that the Iguanodon thoroughly triturated its food before swallowing it. It is not known that it possessed scales, or any form of skin-armor.

IGU'VIUM. See EUGUBINE TABLES: GUBBIO.

IH'LANG-IH'LANG. See Y-LANG-Y-LANG.

IHRE, *ē'rĕh*, JOHAN: 1707-80; b. Lund, Sweden, of Scottish extraction: philologist. He was educated at the Univ. of Upsala, where he acquired great reputation, and took the highest honors. He travelled in France and England, was appointed under-librarian to the Acad. of Sciences on his return to Sweden, and rose through a variety of offices to be prof. of belles-lettres and political economy (1748). Ihre's principal work is his *Glossarium Suiogothicum* (1769), a work of great erudition, which is regarded as the foundation of Swedish philology. It was published at the cost of the state, which gave Ihre $10,000 to execute it. His more than 450 academical disputations are still valuable, especially those on the Mœso-Gothic version of the Gospels by Ulfilas.

I. H. S.: an abbreviation for Jesus (Gr. ΙΗΣΟΥΣ)—the H representing the long e. To mark the contraction, the abbreviation was formerly written IH̄C (Greek C = S), which in later times became IH̄S. The H̄ being misunderstood, the idea arose that IHS meant *Jesus Homi-*

num Salvator, 'Jesus Saviour of Men,' and the mark of contraction over the H being thus rendered unmeaning, was turned into a cross, as on modern altar-cloths.

IKU'PA: principal river of Madagascar (q.v.).

IL, *ĭl:* a prefix signifying *not* before adjectives: see IN. *Note.*—In It. *il* = the; Sp. *el* = the; L. *ille* = he.

ILCHESTER, *ĭl'chĕs-tĕr* (formerly IVELCHESTER): small and decayed town of England, county of Somerset, in the rich valley of the Yeo or Ivel—from which it derives its name—33 m. s.s.w. of Bath. The principal buildings are the parish church, an ancient structure surmounted by a low octagonal tower, and the county jail. Ilchester, supposed to be the Ischalis of Ptolemy, was the principal station of the Romans in this region, and was fortified by them with a strong wall and ditch, both still traceable. Numerous Roman remains have been found here. Ilchester is the birthplace of Roger Bacon. Pop. abt. 800.

ILE-DE-FRANCE, *ēl-dĕh-frŏngss':* one of the old provinces of France, having Paris as its capital, and now mostly comprised in the depts. Seine, Seine-et-Oise, and Oise. During the last century of the Carlovingian dynasty, the Ile-de-France was possessed by a race of powerful nobles, who latterly took the title of Dukes of France. One of the most able of these was Hugo or Hugues, surnamed Le Blanc, or Le Grand, who, for twenty years previous to his death (956), virtually wielded the sovereign power under the Carlovingian kings Louis IV. and Lothaire. His son, Hugo Capet, eventually became the actual sovereign. See CAPETIAN DYNASTY.

ILEO, *ĭl'ĕ-ō* [L. and Gr. *ilĕŏs*, a severe kind of colic—from Gr. *eilĕō*, I turn or twist: L. *īlĕ*, a gut, the flank; *īlĭă*, the entrails of animals]: in *anat.*, a prefix denoting connection with the intestine called *ileum*, or relation to it. ILEUM, n. *ĭl'ĕ-ŭm*, the lower portion of the small intestines, so called from its numerous convolutions. ILEUS, n. *ĭl'ĕ-ŭs*, called sometimes ILIAC PASSION: obstruction in the bowels accompanied by vomiting, pain, and fever; intussusception of the bowels. It may indeed occur in any case in which the contents of the bowel cannot make their way onward. The peristaltic action of the intestine is inverted; there is intense vomiting, and even feculent matter is discharged by the mouth. Desperate as the condition of the patient is, his case is not absolutely hopeless; recovery may occur spontaneously, or may be assisted by hot baths and other relaxing measures, and sometimes by the internal administration of anti-spasmodic remedies.

I'LETZK, or ILETZKAÏA ZASHCHITA: small town and fort in Eastern Russia, on the border of the Kirghiz territory (govt. of Orenburg), on the river Ilek, near its

confluence with the Ural; lat. 51° 9′ n., long. 54° 59′ e. The town was founded by Cossack emigrants 1737. It is remarkable for its quarries of rock-salt, richest in Russia. The salt-beds of Iletzk were formerly worked by the native Bashkirs, but since 1754 both the extraction and sale of the salt are monopolized by the govt., and are the source of considerable revenue. All the country round Iletzk, especially along the river Solianka, is one continual layer of salt, covered with a sandy or clayey alluvion, 3½ to 4½ ft. thick. The thickness of the salt bed is not yet thoroughly ascertained, notwithstanding many investigations, from Pallas till the present time. The Iletzk salt is considered the best in Russia. On the surface of the bed, cubic blocks of salt are found, pure and transparent like crystal, weighing 3 to 30 lbs. each. Various small articles are manufactured out of such blocks, and the common people ascribe to them a healing virtue in ophthalmic disease. Near Iletzk are two lakes, one of which is salt and warm, the other acid. Pop. of Iletzk (1880) 2,886, (1890) 5,769.

ILEX, n. *ī′lĕks* [L.]: in modern *botany*, the genus of the holly (q.v.), consisting of evergreen trees and shrubs; the *Ilex aquifōlĭŭm*, the common holly, ord. *Aquĭfōlĭāceæ*. *Note*—In Gaelic, *uile-ioc* = all-heal, is a general name for the Ilex, Ulex, Holly, and Hollyhock, from their supposed medicinal virtues: see Dr. C. Mackay under Ilex.

Ilex is the name also of a tree frequently referred to in the Latin classics, the Evergreen Oak or Holm Oak (*Quercus Ilex*): see Oak. It is a native of most parts of s. Europe and of n. Africa, often attaining large dimensions. It grows in general singly or in small groups, and thrives in the vicinity of the sea. Its leaves are ovate-oblong, acute, leathery, hoary beneath; but they vary much in some respects, from the size of a sloe leaf to that of a beech, and from being very spiny at the edge to perfect evenness. It is a very ornamental tree, less planted than it deserves. Its wood is very hard and heavy, tough, durable, and useful, particularly for axles, pulleys, screws, and whatever is to be subjected to much friction. The acorns are various quality, sometimes bitter and sometimes sweet and eatable.

ILFRACOMBE, *ĭl′fra-kôm*: small market-town, seaport, and watering-place of England, on the n. coast of the county of Devon, finely situated amid picturesque, irregular hills, on a cove or inlet of the Bristol channel, 11 m. n.n.w. of Barnstaple. The harbor is formed by ramparts of rock, and furnished with a light-house, and a pier 850 ft. in length. The bathing establishment is a Doric building, erected here 1836, and supplied with sea-water from the shore by means of a tunnel. The town is dependent chiefly on its wealthier residents and its summer visitors; but an active fishery and coasting-trade also are carried on. Pop. 8,000.

ILI, or EELEE, *ēlē:* river in central Asia, rising on the n. side of the Thian Shan mountains, about lat. 42° n. and long. 81° e., flowing n.e. through the Kushbegi empire in Chinese Tartary, then n.n.w. past the town of Kooldja, and emptying into Lake Balkash, on the frontier of Siberia, after a course of 600 m.

ILIAC, a. *ĭl'ĭ-ăk* [L. *īlĭă*, the flank, the entrails]: belonging to the bone called *ilium.* ILIAC PASSION (see ILEUS, under ILEO). ILIAC REGIONS, the sides of the abdomen between the ribs and the hips. ILIUM, n. *ĭl'ĭ-ŭm*, the large, partly flattened bone, forming the principal part of the pelvis, and entering into the composition of the hip-joint (see PELVIS). ILIO, *ĭl'ĭ-ō*, in *anat.*, a prefix denoting connection with the iliac bone. ILIAC ARTERIES, arteries pertaining to the pelvis. The aorta (q.v.) divides at its lowest point—usually on the left side of the body of the fourth lumbar vertebra—into the two common iliac arteries, which pass downward and outward on each side to the margin of the pelvis for about 2½ in., and then divide into the external and internal iliac artery of either side. The external iliac passes obliquely downward and outward to the femoral arch, when it enters the thigh, and becomes the femoral artery. The internal iliac is a short vessel, about 1½ in. in length, which divides into an anterior and a posterior trunk. The anterior trunk divides into several branches, which supply chiefly the bladder, the rectum, and the generative organs with arterial blood; while the branches of the posterior trunk mainly supply muscles within and on the outside of the pelvis. For the importance of the internal iliac artery in carrying on the circulation in uterine life, see FETUS,

ILIAD, n. *ĭl'ĭ-ăd* [from L. *Ilĭŭm*, or Greek *Ilĭŏn*, Troy]: the chief epic poem of the anc. Gr. poet, Homer, relating to the siege of Ilium or Troy.

ILIJATS'. See ILIYATS.

ILION, *ĭl'ĭ-ŏn*, an enterprising town in Herkimer co., N. Y., situated on the Mohawk river, about 12 m. s.e. of Utica. The Erie canal passes through the place, and it has railroad connection over the lines of the West Shore and the N. Y. Central and Hudson River railroads. It is connected likewise with Mohawk, Herkimer, and other points by trolley lines. It is situated in a rich agricultural district, but is noted mainly for its manufacturing enterprises, among which are typewriters, firearms, bicycles, filing-cases, and knit goods, which are produced on a large scale. The Remington sewing machines were formerly manufactured here, but that establishment has been merged into the Remington Arms Company, which has its principal establishment at Ilion. It has a public library containing nearly 12,000 volumes, besides a number of fine public buildings, and many handsome residences. Pop. (1910) 6,588.

IL'IOS, or ILIUM: ancient city. See TROY.

ILIS'SUS. See ATHENS; ATTICA.

ILIUM, n. See under ILIAC.

ILIYATS, or ILIJATS, *ē-lē-yâts'*, or EELIAUTS, *ē-ēl-yawts'*: tribe of Turkish, Arabic, and Kurdish descent, nomadic in habits, Mohammedan in faith, and found largely in Persia, Khiva, and Turkistan. They dwell in tents, change their encampments with the seasons, breed large herds of sheep and cattle, are given to plunder and robbery, and are governed by a royal family of the Kajar tribe. The tribes of the Khiva region number more than 200,000 persons, and the Kashkai tribe occupy 25.000 tents.

ILK, n. *ĭlk* [AS. *ylc*, the same, ilk: Goth *svaleiks*, so like: AS. *swilc*, such, the like]: in *OE.*, the same; the same place; in *Scot.*, an addition put to a gentleman's name when the name of his estate is the same with his surname, as Balfour of that *ilk*—that is, Balfour of Balfour.

ILKESTON, *ĭl'kĕs-ton:* thriving market town of England, county of Derby, 10 m. n.e. of the town of Derby, on an eminence in the valley of Erewash. Ilkeston is known by the repute of its alkaline springs and baths. It has manufactures of hosiery and lace, with coal and iron works in the vicinity. Pop. 19,744.

ILL, a. *ĭl* [Dan. *ilde;* Sw. *ĭlla;* Icel. *ĭllr*, ill, badly; Goth. *ubils;* Ger. *übel;* AS. *yfel*, evil: comp. Gael. *iol*, sick]: bad; evil; contrary to good; unfortunate; unfavorable; sick; unwell; cross; surly; ugly or repulsive, as ill looks; suspicious: ad. as the first element of a compound, signifying 'a negation' or 'some bad quality connected with it'; not well; badly; not easily: n. evil; misfortune; wickedness. ILL'NESS, n. sickness; indisposition. ILL-BLOOD, hostile feeling; resentment. ILL-BRED, a. badly taught; rude. ILL-BREEDING, n. roughness and rudeness of manners; unpoliteness. ILL-FAUR'D, *ĭl-fawrd'*, in *Scot.*, ill-favored; having a cross, forbidding aspect; ugly. ILL-FASHIONED, *-făsh'ŭnd*, in *OE.*, ill-mannered; having a cross, quarrelsome temper. ILL-FAVORED, ill-looking; ugly; deformed. ILL-HADDEN, *-hăd'n*, in *Scot.*, ill-holden; not kept under restraint. ILL-NATURE, n. *ĭl-nā'tūr* or *-chûr*, habitual bad temper; crossness. ILL-NA'TURED, a. *-tūrd*, habitually bad-tempered; crabbed; unamiable; unkindly; surly. ILL-NA'TUREDLY, ad. *-lĭ*. ILL-OMENED, attended with dismal forebodings or bad omens. ILL-REDD-UP [Scot. *red*, to put in order]: in *Scot.*, in a state of disorder. ILL-SET, evil-disposed; spiteful; ill-natured. ILL-STARRED, influenced by evil stars; fated to be unfortunate. ILL-SUPPRESSED, subdued or suppressed with difficulty, as indignation. ILL-TEMPERED, crabbed; peevish. ILL-TIMED, a. said or done at an unsuitable time. ILL TURN, an unkind or injurious act; a slight attack of illness. ILL-WARED, *-wārd*, in *Scot.*, laid out or

spent to little or no good, as money. ILL-WILL, hostile feeling; enmity. *Note.*—In most cases, when *ill* is used as a prefix or the first element of a compound, it would be well to unite the two words by a hyphen, this, *ill-conditioned, ill-assorted, ill-devised,* etc.—SYN. of 'ill, a.': disagreeable; wicked; wrong; naughty; iniquitous; diseased; disordered; indisposed; unpolished; rude; incorrect; inelegant; crabbed; peevish;—of 'illness': disease; disorder; badness; malady; in *OE.*, wickedness; iniquity; unrighteousness.

ILLAPSE, n. *ĭl-lăps'* [L. *illapsus,* a slipping or gliding in—from *il,* in or on; *lapsus,* a falling, a slipping]: a sliding in; a falling on.

ILLATIVE, a. *ĭl'lă-tĭv* [L. *il,* in or on; *lātus,* brought or carried]: that may be inferred; that denotes an inference, as an *illative* word or particle, *then, therefore,* etc.: n. that which denotes illation or conclusion. IL'-LATIVELY, ad. *lĭ.* ILLATION, n. *ĭl-lā'shŭn* [F.—L.]: a conclusion drawn from premises; an inference; an imperfect syllogism. ILLATIVE-CONVERSION, n. in *logic,* that in which the truth of the converse follows from the truth of the proposition given; as the proposition, Religion is the truest wisdom, becomes by illative-conversion, The truest wisdom is religion. ILLATIVE-SENSE, n. that faculty of the mind by which it forms a judgment on the validity of an inference.

ILLE-ET-VILAINE, *ēl-ā-vē-lān':* maritime department in the n.w. of France, formed out of a portion of the old province of Bretagne. It is quadrangular in shape, between the English channel and the dept. of Loire-Inférieure; 2,590 sq.m., or 1,646,670 sq. acres, of which 1,016,580 acres are arable land. It is watered chiefly by the rivers from which it derives its name—the Vilaine, and its tributary, the Ille. The usual grain-crops are raised in sufficient quantity for the wants of the population. Flax and hemp are extensively produced, and the cider of this district is esteemed the best in the country. Cattle are reared in great numbers, iron mines are worked, and great varieties of linen and woolen fabrics are manufactured. The dept. is divided into six arrondissements—Rennes, Fougères, Montfort, St. Malo, Vitré, and Redon. Rennes is the cap., and St. Malo the principal seaport. Pop. of dept. 611,477.

ILLEGAL, a. *ĭl-lē'găl* [F. *illégal*—from L. *illēgālĭs*—from L. *il,* not; *lēgālĭs,* legal—from *lex,* law]: contrary to law; unlawful. ILLE'GALLY, ad. *-lĭ.* IL'LEGAL'ITY, n. *-găl'ĭ-tĭ* [F. *illégalité*]: the state of being contrary to law; unlawfulness. ILLE'GALIZE, v. *-lē'găl-īz,* to render unlawful. ILLE'GALIZING, imp. ILLE'GALIZED, pp. *-īzd.*

ILLEGIBLE, a. *ĭl-lĕj'ĭ-bl* [L. *il,* not; *legĭbĭlĭs,* that may be read—from *lĕgō,* I read]: that cannot be read; not easily read; defaced. ILLEG'IBLY, ad. *-blĭ.* ILLEG'-

IBIL'ITY, n. *-bĭl'ĭ-tĭ,* the quality of being not readable or not easily read.

ILLEGITIMATE, a. *ĭl'lĕ-jĭt'ĭ-māt* (L. *il,* not; *legĭtĭmus,* lawful]: born out of wedlock; contrary to law; not genuine: v. to prove to be born out of wedlock; to bastardize. IL'LEGIT'IMATING, imp. IL'LEGIT'IMATED, a. *-mātĕd,* proved to have been born out of wedlock. IL'LEGIT'IMATELY, ad. *-lĭ.* IL'LEGIT'IMACY, n. *-mă-sĭ,* the state of being born out of wedlock; bastardy: see LEGITIMACY: BASTARDS AND BASTARDY. IL'LEGITIMA'TION, n. *-mā'shŭn,* state of not being born in wedlock; want of genuineness.

ILLIBERAL, a. *ĭl-lĭb'ĕr-ăl* [L. *il,* not; *liberālis,* befitting a freeman, liberal]: of a contracted mind; not liberal; niggardly; mean; wanting charity in judging. ILLIB'ERALLY, ad. *-lĭ.* ILLIB'ERAL'ITY, n. *-ăl'ĭ-tĭ,* narrowness of mind; meanness.

ILLICIT, adj. *ĭl-lĭs'ĭt* [F. *illicite,* illicit—from L. *illĭcĭtus,* not allowed—from L. *il,* not; *lĭcĭtus,* permitted, allowed: It. *illicito*]: unlawful; prohibited by law. ILLIC'ITNESS, n. *-nĕs,* unlawfulness. ILLIC'ITLY, ad. *-lĭ.*

ILLICIUM, *ĭl-lĭs'ĭ-ŭm:* genus of trees of nat. ord. *Magnoliaceæ,* having flowers with three or six petal-like sepals, numerous petals arranged in several rows, and numerous stamens and pistils; the capsules arranged in a star-like form, opening upward, and each containing a single seed. The species are few but very widely distributed. The most important is *I. anisatum,* the fruit of which is known as Star Anise, or Chinese Anise: see ANISE. This tree is held in high estimation among the Japanese, and is planted near their temples, as their gods are supposed to delight in it.—Among the other species is *I. Floridanum,* a shrub with fine pendant clusters of dark purple flowers, native of Florida and Louisiana, of which the leaves are very fragrant, the capsules also smelling of anise, though more faintly than those of the Chinese tree. Similar in fragrance is *I. parviflorum,* another Floridian species.

ILLIMANI, *ēl-yē-mâ'nē:* one of the principal mountains of the Bolivian Andes: see ANDES.

ILLIMITABLE, a. *ĭl-lĭm'ĭt-ă-bl* [L. *il,* not; *limĭtārĕ,* to bound or limit]: that cannot be limited or bounded. ILLIM'ITABLY, ad. *-ă-blĭ.* ILLIM'ITEDNESS, n. exemption from all bounds.—SYN. of 'illimitable': boundless; limitless; unbounded; unlimited; vast; immense; immeasurable; infinite.

ILLINOIS, *ĭl-ĭ-noy'* or *ĭl-ĭ-noys':* state; one of the United States of America, 8th in order of admission into the union; known as the 'Prairie State,' and named from an Indian tribe, 'a superior class of men.'

Location and Area.—Illinois is in the upper Miss. valley, lat. 36° 59′—42° 30′ n., long. 87° 35′—91° 40′ w.;

bounded n. by Wis., e. by Lake Michigan, Ind., and Ky., s. by Ky., w. by Mo. and Io.; extreme length 385 m., extreme width 218 m., average width 156 m.; 56,650 sq.m. (36,256,000 acres); greatest elevation above the sea 1,150 ft.; extent of navigable streams 4,000 m.; cap. Springfield.

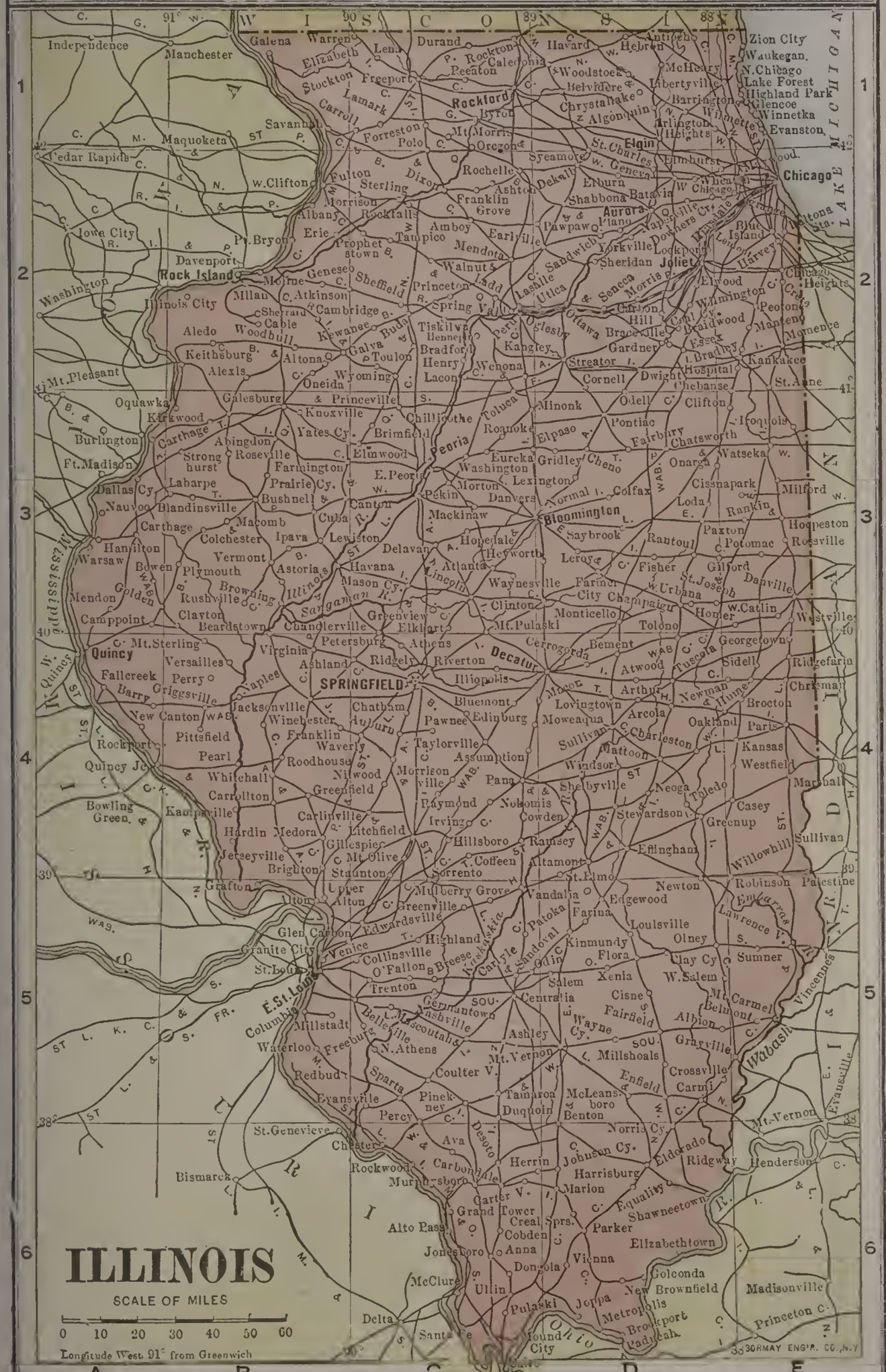
Topography.—The surface is nearly level, the lowest part being 400 ft. above the sea, and the grand prairie about 500 ft. It is in the main high table-land, with an abundance of prairie and woodland. The drainage is by the Miss. river and its tributaries, the Ohio, Kaskaskia, Illinois, and Rock rivers, with their smaller affluents. The Illinois river is the largest wholly within the state, having a flow of nearly 300 m., and being formed by the Des Plaines of Wis. and the Kankakee of Ind. Its chief rival is the Kaskaskia, which flows nearly parallel with it 150 m. The lake system is almost confined to Lake Pishtaka in the n.e., and Peoria lake, a widening of Illinois river. Interesting surface features are the Miss. river bluffs, also remains of the mound builders, and several caverns, particularly that near Chester.

Climate.—In the n. the heat of summer and the cold of winter are intense, but the summer temperature is agreeably modified by continuous breezes. On an average, there are 240 clear days to 120 cloudy in the year. In the centre of the state—about lat. 40° n.—the mean temperature of the year is 54°, with summer rise (mean) to 77°, and winter fall to 33½° F. At Beloit, in Wis. near n. line, the mean annual temperature is 47½°, and at Cairo, in the extreme s., 58½°. The prevailing winds are n., n.w., s., and s.w. The climate generally is considered healthful. Paludal or marsh fevers prevail in the low southern section, but the prairie lands are free from endemic diseases. Good drainage and cultivation have done much to relieve the state generally of disorders of malarial origin.

Geology.—The soil is of diluvial origin on almost continuous coal measures. The coal is bituminous. Lead ore bearing silver is found in Jo Daviess co., and is profitably worked; salt abounds near the head waters of Big Muddy river, Saline creek and Little Wabash river in the s.; sulphur and chalybeate springs are numerous in Jefferson co.; limestones for burning and building, drab freestones, variegated marble, and gypsum are included in the mineral resources; and oak, black walnut, ash, elm, sugar maple, locust, linden, hickory, pecan, yellow poplar, yellow pine, beech, cedar, cottonwood, sycamore, and persimmon are among the forest growths, while the fruits comprise apple, cherry, grape, peach, and plum. The annual production of coal in I. is about 43,000,000 tons; the annual production of pig-iron about 2,500,000 tons. Other mineral productions are sandstone, limestone, hydraulic cement, etc.

Zoology.—The rapid settlement of the state has al-

Area in Square Miles, 56,650. Population, 4,821,550.
Number of Counties, 102. Capital of State, Springfield.



most annihilated its game animals. Two species of the hare, the wild turkey, prairie hen, some grouse, a few foxes, the gopher, and squirrel are almost the only wild animals left; deer, bear, wild-cat, and panther—once numerous—are now rarely found. There is an abundance of small game birds, and the shallow lakes in the n.e., as well as some of the rivers, still yield large quantities of white fish, lake trout, and black bass.

Agriculture.—Agriculture is in a thriving state in I., there being nearly 300,000 farms, comprising approximately 35,000,000 acres, four-fifths of the land being improved. The total value of all farm property, including lands and improvements, implements and machinery, and live stock is approximately $2,100,000,000. The principal crops are corn, wheat, oats, barley, rye, buckwheat, potatoes, hay, cotton, and tobacco.

Manufactures.—There are well over 15,000 manufacturing establishments, annually producing goods to the value of about $2,000,000,000. The leading industries are slaughtering and meat packing, iron and steel, foundry and machine-shop products, clothing, liquors, flour and grist-mill products, agricultural implements, steam railroad cars, printing and publishing, and furniture. I. is outranked only by New York and Pennsylvania in the importance of its manufactures, and is easily the most important manufacturing state w. of the Alleghany mountains. Chicago, with the slaughtering and meat-packing industries, foundry and machine shops, and the manufacture of iron and steel, with the by-products centred there, produces about 70 per cent. of the total manufactured product of the State. The value of the products of slaughtering and meat packing constitutes over one-third of the total of the 24 leading industries of the State, and, since the entire animal is utilized, the value of the by-products has assumed remarkable importance, the value of soap alone being well in excess of $13,000,000, and that of tanned, cured, and finished leather more than $10,000,000. Coal mining also forms an extensive industry of the State. I. stands third among the States in the production of iron and steel manufactures, Chicago and Joliet being the principal centres. In the production of steam cars I. stands second, and in agricultural implements first.

Commerce.—I. comprises a single U. S. customs district, of which Chicago is the port of entry. The imports of merchandise aggregate about $25,000,000 in value and the exports about $5,000,000 annually. Including both sailing and steam vessels about 500,000 tons enter and clear the port annually, about two-thirds of which are American boats. The communication with the East afforded by Lake Michigan and its connecting waters has made Chicago the great distributing centre for eastern products to all points of the West and Southwest. Superior railroad facilities came as a direct

result of the trade routes established by these operations for water transportation, for when railroad building began Chicago was the logical focusing point, and to reach that city all sections of the State were traversed and opened up to settlement.

Transportation.—At present I. has nearly 13,000 miles of track, divided among many prominent lines, such as the Santa Fé, Baltimore and Ohio, etc., besides over 60 street and electric railway lines, operating about 3,500 miles of track. The principal water routes are the I. river, navigable for 150 miles, and connected with Lake Michigan by the I. and Michigan canal; the Kankakee, Des Palines, Kaskaskia, and Rock rivers. Smaller streams are the Little Wabash, Embarras, Vermilion and Fox.

Finance and Banking.—I. has a total assessed valuation of $2,158,648,450, and a tax rate of $3.50 per $1,000. There is no bonded debt. There are about 400 national banks, almost as many State banks, about 150 private banks, and numerous savings banks and building and loan associations as well. Loan and trust companies are few, but both Chicago and Peoria do an extensive clearing house business.

Education.—There are about 1,500,000 children enrolled in the public schools, with about 29,000 teachers, the cost of maintaining the public schools being considerably in excess of $30,000,000. There are numerous normal schools, private schools, co-educational colleges and universities and colleges and universities for men only, female seminaries, and schools of technology, theology, law, and medicine. The most prominent of the many institutions for higher education in the State are the University of Chicago and the University of I.

Charitable and Penal Institutions.—The state charitable institutions, with their locations, are as follows: Northern Hospital for the Insane at Elgin; Eastern Insane at Kankakee; Central Insane at Jacksonville; Southern Insane at Anna; Western Insane at Watertown; Incurable Insane at Bartonville; Criminal Insane at Chester; Deaf and Dumb at Jacksonville; Blind at Jacksonville; Feeble Minded at Lincoln; Soldiers and Sailors at Quincy; Soldiers' Orphans' Home at Normal; Soldiers' Widows at Wilmington; Eye and Ear at Chicago; Girls' Training School at Geneva; Boys' Home at St. Charles. The penal institutions consist of the Illinois State Reformatory at Pontiac, the Illinois State Penitentiary at Joliet, with about 1,300 inmates, and the Southern Illinois Penitentiary at Chester, with about 900 inmates.

History.—The territory now included in Illinois was discovered by Jacques Marquette (q.v.), the French Jesuit priest and missionary, and Louis Joliet (q.v.), explorer, who led a small party from Quebec early in 1673. They entered the Miss. river at the mouth of the Wis. river, reached Illinois June 20, and descended nearly

STATE CAPITOL AT SPRINGFIELD.

to the mouth of the Ark. river July. Six years afterward Robert La Salle (q.v.), then recently appointed gov. of Fort Frontenac, built a vessel on Lake Erie, began a voyage of discovery, passed through Lakes Huron and Michigan, reached the Illinois river, built a fort on the site of Peoria, and returned to Canada 1680. In 1682 he made a second voyage, taking with him a considerable number of Canadians, made settlements at Kaskaskia, Cahokia and other river towns, and proceeded thence to the mouth of the Miss. river. The colonists thrived in their new home, became intimate with the Indians, and were visited by Jesuit missionaries early in the 18th c. The French claimed jurisdiction over the region by virtue of discovery, and it was considered a portion of the terr. of La. till 1765, when by the terms of the treaty of Paris, ratified 1763, it became a British possession, with all the country e. of the Miss. river, and was subsequently created a co. of Va. The region had prosperity and peace for many years. Its share in the revolutionary war was almost confined to the capture of the British posts of Vincennes and Kaskaskia by Gen. George Rogers Clarke (q.v.) 1778, July 4. In 1784, all the terr. n.w. of the O. river and e. of the Miss. belonging to Va. was ceded to the federal govt., and this region, by act of congress 1787, July 13, was erected into the Northwest Terr. and placed under a single govt. This enormous terr. was subdivided 1800, and what is now Illinois formed a part of the Indian Terr. till 1809, when the Terr. of Illinois was organized from the present Illinois with Wis. and part of Minn. The seat of govt. was located at Kaskaskia, and Ninian Edwards was appointed the first gov. About this time ill feeling between the Indians and settlers began to threaten open hostility, but no outbreak occurred till 1812, Aug., when the Indians made an attack on the fort at the mouth of the Chicago river, and not only massacred nearly all the garrison, but many settlers in the vicinity. Prompt and severe punishment kept the Indians comparatively quiet till 1831, when Black Hawk, chief of the Sacs, who had removed to the present Io., recrossed the river, and attacked the whites. He was speedily checked and apparently subdued; but though he had sued for peace and reaffirmed the treaty with the govt. of 1804, he suddenly reappeared 1832, Apr., and waged a brief but bloody and hopeless war. Between these periods Illinois gained largely in population from the e. states, and with its present limits was admitted as a state into the union 1818, Dec. 3. Its population as a separate terr. (1810) was 12,282, and as a state (1820) 55,211, (1830) 157,445. In 1834, congress made an appropriation for the improvement of the harbor of Chicago; 1835, the Illinois and Michigan canal (q.v.) was projected, and the state bank organized; 1836, ground was broken for the canal; and 1840, the capital was removed to Springfield, and the Mormons removed from

Mo. to Nauvoo, Ill., began erecting a temple, and conducting themselves so offensively that after their leaders, Joseph and Hyrum Smith, had been arrested, put in Carthage jail, and there killed by the populace 1844, June 27, the whole community was expelled from the state. Illinois contributed 6 regts. for service in the Mexican war. In 1848 the Illinois and Michigan canal was completed at a cost of $6,409,509; and 1850, immigration received new stimulus through a munificent congressional land grant in aid of the construction of the Ill. Central railroad. During the civil war Illinois furnished 259,092 men to the union army, and lost, killed in action 5,888, died of wounds 3,032, died of disease 19,496, died in prison 967, lost at sea 205, total loss 29,588. Since then the chief events have been the great fire in Chicago 1871, Oct., when nearly 18,000 buildings were destroyed, 300 lives lost, 100,000 people rendered homeless, property losses $192,000,000; the anarchist riot in Chicago 1886, May 3; and strikes at the coal mines and at the plant of the Pullman Palace Car Co., in the suburbs of Chicago, both in 1894, May. The first state constitution continued in force till 1848, the second till 1870. The third and present instrument limits the debt that may be created for casual deficits and failures of revenue (as specified in the constitution of 1848) to $250,000, and prohibits the state from paying, assuming, or becoming responsible for the debts or liabilities of any public or other corporation, association, or individual. That Illinois is now a debtless state is due to these constitutional enactments. The 1870 constitution forbids the general assembly and every municipality from making any appropriation in aid of any sectarian purpose; forbids every municipality from becoming a subscriber to the stock of any railway or other business corporation, or to lend its credit in any way to such corporation; and limits the indebtedness of all municipalities to 5 per cent. of the value of their taxable property. An exception to the last provision is made in a law to divide cities and villages subject to overflow into improvement districts, the statute authorizing improvement bonds which are made special liens on the land benefitted, without reference to the limit.

Government.—The executive authority is vested by the constitution in a gov., elected for 4 years, salary $6,000 per annum; the legislative in a general assembly comprising a senate of 51 members elected for 4 years, and a house of representatives of 153 members elected for 2 years, salary of each $5 per day, mileage 10c., and $50, biennial sessions, without limit of time; and the judicial in a supreme, circuit, and co. courts, and the usual justices of the peace, and magistrates. Supreme court judges are elected for 9 years, circuit court 6, and co. court 4. The chief justice is elected by his associates. Other state officers are a lieut.gov., sec. of state, auditor, treasurer, supt. of public instruction, adj.gen., and atty.gen.

ILLINOIS.

The successive govs., with their terms of service since the admission of the state into the union, are as follows:

Shadrack Bond	1818-22	Richard J. Oglesby	1865-69
Edward Coles	1822-26	John M. Palmer	1869-73
Ninian Edwards	1826-30	Richard J. Oglesby	1873
John Reynolds	1830-34	John L. Beveridge	1873-77
Joseph Duncan	1834-38	Shelby M Cullom	1877-83
Thomas Carlin	1838-42	John M. Hamilton	1883-85
Thomas Ford	1842-46	Richard J. Oglesby	1885-89
Augustus C. French	1846-53	Joseph W. Fifer	1889-93
Joel A. Matleson	1853-57	John P. Altgeld	1893-97
William H. Bissell	1857-60	John R. Tanner	1897-1901
John Wood	1860-61	Richard Yates	1901-05
Richard Yates	1861-65	C. S. Deneen	1905-

Counties, Cities and Towns.—Illinois is div. into 102 counties; in 1910 Chicago had pop. 2,185,283; Peoria 66,950; Quincy 36,587; Springfield 51,678; Rockford 45,401; Joliet 34,670; Bloomington 25,768; Aurora 29,807; Elgin 25,976; Decatur 30,140; Belleville 21,122; Galesburg 22,089; E. St. Louis 58,547; Rock Island 24,335; Jacksonville 15,326; Moline 24,199; Danville 27,871; Streator 14,253; Cairo 14,548.

Politics.—State, congressional, and presidential elections are held on first Tuesday after the first Monday in Nov. Citizens of the U. S. who have resided in the state 1 year, in the co. 90 days, and in the town and precinct 30 days, are entitled to vote. Convicts and those guilty of bribery at elections are excluded. For votes for president and vice-president see PRESIDENT AND VICE-PRESIDENT, ELECTIONS OF.

Population.—(1810) 12,282; (1820) 55,211; (1830) 157,445; (1840) 476,183; (1850) 851,470; (1860) 1,711,951; (1870) 2,539,891; (1880) 3,077,871; (1890) 3,826,651; (1900) 4,821,550; (1910) 5,638,591.

ILLINOIS' RIVER: principal stream in Ill. and with the Ill. and Mich. canal (q.v.) providing an all-water route from Lake Mich. to the Miss. river. It is formed by the union of Des Plaines and Kankakee rivers in Grundy co., almost bisects the state, flows s.w. through Peoria lake, and after a total course of nearly 300 m. empties into the Miss. river about 20 m. above Alton. It is fed chiefly by the Fox and Sangamon rivers, traverses the richest agricultural and bituminous coal regions of the state, and has a number of flourishing cities and towns on its banks, notably Peoria, Ottawa, La Salle, and Pekin. It is navigable by steamboats 150 miles.

ILLINOIS, UNIVERSITY OF: at Urbana, Champaign co., Ill.; known previous to 1885, July 1, as the Illinois Industrial University. It was established under the act of congress 1862, granting public land to the states for educational purposes under special conditions (see CORNELL UNIVERSITY). Its apportionment of land was 480,000 acres, all of which, excepting 25,000 acres in Neb. and Minn., were sold and the proceeds put into bonds. Champaign co. gave grounds, buildings and farms valued at $450,000, and the state has since appropriated to it much

more. The university was opened 1868, and its organization has expanded till it now comprises a college of agriculture and horticulture, and college of engineering and architecture; college of natural sciences, chemistry, and natural history; college of literature and art; the academy; state library school; school of music; colleges of law, medicine, dentistry, and pharmacy (the three latter located at Chicago); in 1871 women were admitted, and 1878 under a state law the university began conferring degrees. The governing board consists of the governor of the state, pres. of the state board of agriculture, supt. of public instruction and 9 trustees elected by popular vote. In 1904-5, there were 392 professors and instructors and 3,725 students in all departments; the annual income amounts to $900,000, and the general university library contained 71,039 vols., beside pamphlets. There were also the library of the State Laboratory of Natural History (15,000 vols.), the library of the college of law, and the special collection of the department of education (1,500 books and 3,000 pamphlets).

ILLINOIS AND MICHIGAN CANAL: artificial water route between Lake Michigan at Chicago and the Illinois river at La Salle; length 96 m.; begun 1836, July 4; opened for spring navigation 1848; cost $6,409,509. A connection between the two waters was first suggested 1814, and the project received the approval of a special committee of congress, who reported that it would be the greatest work of the age. As first planned, it contemplated a direct cut from Lake Mich. to the Des Plaines river, the e. branch of the Illinois river. A tract of land bordering on the lake and including the site of Chicago was bought from the Indians 1816, and 1822 congress granted the right of way through the public lands, and a strip of land 90 ft. in width on both sides the projected line. Estimates ranging from $639,000 to $716,000, and several surveys for routes were made; congress voted the state in aid of the work (1827) all the alternate sections of land within 5 m. of the line, an aggregate of 286,000 acres, and subsequently added 32,895 acres, making 318,-895 in all; a board of commissioners with authority to sell the congressional land-grant and construct the canal was appointed 1829; govt. engineers made further surveys 1830; the state submitted new surveys and estimates —$4,043,000 for a completed canal 49 ft. wide and 4 ft. deep 1833; and work was begun on plans that called for a cut 60 ft. wide at surface, 36 ft. at bottom, and 6 ft. deep, to cost complete $8,654,000, 1836. Financial questions caused an interruption 1841-45, but after unusual authority had been delegated to three trustees, the work was hastened to completion. In 1871, the canal became the property of the state under its terms of contract with the trustees, who had paid all the bonds and the special loan of $1,600,000, principal and interest; and it

has since been managed by a board of three commissioners appointed by the governor. The canal has five navigable feeders aggregating 25 m. in length, each 40 ft. wide and 4 ft. deep; 4 aqueducts; 7 dams; large basins at Lockport, Joliet, Du Page, Ottawa, and La Salle; and locks and dams at Henry and Copperas Creek, those at the latter being partially built by the U. S. govt., which has since been at work on similar improvements at La Grange and Kampsville Landing, to secure uninterrupted navigation to the Miss. river throughout the year.

ILLINOIS' INDIANS: formerly a powerful group occupying what is now Ill., beside large tracts w. of the Miss. river. They comprised the Cahokia, Peoria, Kaskaskia, Tamaroa, and Moingwena tribes; were on friendly terms with the early French missionaries and settlers, and frequently fought the Sac, Fox, and other non-Algonkin tribes. Their few descendants living are mostly in Indian Territory.

ILLITERATE, a. *ĭl-lĭt'ĕr-āt* [L. *illitĕrātŭs,* uneducated —from *il,* not; *litĕræ,* learning—from *litĕrā,* a letter]: ignorant; uninstructed. ILLIT'ERATELY, ad. *-lĭ.* ILLIT'ERATENESS, n. and ILLIT'ERACY, n. *-ās-ĭ,* want of learning or reading; ignorance.—SYN. of 'illiterate': untaught; unlearned; unlettered.

ILLNESS. See under ILL.

ILLOGICAL, a. *ĭl-lŏj'ĭ-kăl* [L. *il,* not, and *logical*]: contrary to the rules of logic or sound reasoning; ignorant of the rules of sound reasoning. ILLOG'ICALLY, ad. *-lĭ.* ILLOG'ICALNESS, n.

ILLUDE, v. *ĭl-lôd'* [L. *illūdĕrĕ,* to play on, to sport with—from *il,* in or on; *lūdō,* I play]: to deceive; to mock; to play upon by artifice. ILLU'DING, imp. ILLU'DED, pp.

ILLUME, v. *ĭl-lôm'* [L. *il,* not; *lūmen, light* (see ILLUMINATE)]: to enlighten; to brighten; to adorn; to illuminate. ILLUM'ING, imp. ILLUMED, pp. *ĭl-lômd'.*

ILLUMINATE, v. *ĭl-lô'mĭ-nāt* [L. *illūmĭnātus,* lighted up—from *il,* in or on; *lūmĕn,* light: It. *illuminare:* F. *illuminer*]: to throw light on; to adorn, as books, margins, etc.; to enlighten; to illustrate; to light up with lamps on any festive occasion: N. one of the illuminati. ILLU'MINATING, imp. illustrating; adorning: N. the act of adorning manuscripts and books with ornamental letters and pictorial illustrations. ILLU'MINATED, pp.: ADJ. having ornamented letters and pictorial illustrations: see MANUSCRIPTS. ILLU'MINA'TION, n. *-nā'shŭn* [F.—L.] the act of supplying with light; that which gives light; the act of adorning, as with ornamented letters and pictures; a display of lights; inspiration. ILLU'MINATIVE, a. *-nā'-tĭv,* able to give light. ILLU'MINA'TI, n. plu. *-ĭ-nā'tī,* the enlightened; a name assumed by various sects at different times and places, and who pretended to special spiritual or intellectual enlightenment; specially a secret society

of Germany 1776 (see below). ILLU'MINATOR, n. *-nā-tėr*, one who gives light; one who adorns. ILLU'MINATORS, n. plu. *-tėrz*, the artists who executed the drawings in colors and gold in anc. manuscripts. ILLUMINE, v. *ĭl-lô'mĭn*, to supply with light; to enlighten; to adorn. ILLU'MINING, imp. ILLU'MINED, pp. *-mĭnd*.

ILLUMINATI, *ĭl-lūm-ĭn-ā'tī* (*the Enlightened*): name borne by four different societies—that of the *Alombrados* in Spain, in the end of the 16th c.; that of the *Guerinets* in France, about 1684, enthusiasts and visionaries; an association of Mystics in Belgium, in the latter half of the 18th c.; and the *Order of the Illuminati*, founded at Ingolstadt 1776, May 1, which soon spread over almost all the Rom. Cath. parts of Germany. It is this *Order of the Illuminati* which is now commonly denoted by the term. Its founder at first called it the Order of the Perfectibilists. It owed its existence to Adam Weishaupt, prof. of canon law at Ingolstadt, a man of superior abilities and much benevolence, but deficient in practical knowledge of mankind. Filled with detestation of Jesuitism and impatient of the restraints at that time imposed on the human mind in Rom. Cath. Germany, and in no part of it more than in Bavaria, under the bigoted administration of Elector Charles Theodore, he conceived the idea of forming an association which should extend its ramifications everywhere, and should consist of the choicest spirits, should labor for the establishment of the dominion of reason, and promote religious and political enlightenment and emancipation. Religious dogmas and forms of worship were to be rejected, a system of deism was to be propagated, and republican opinions. The accession of the Baron von Knigge to the new order, and the support which it received from the Freemasons, led to its rapid extension, so that, at one time, more than 2,000 of the most accomplished men in Germany were members of it. Weishaupt's knowledge of the order of the Jesuits led him to borrow some of their methods for the accomplishment of what he regarded as the most opposite ends; and the Illuminati were soon involved in a system of mutual espionage, confession, and the like, essentially inconsistent with true freedom, but calculated to place the threads all in one hand, by which the holy legion was to be led on, as it was imagined, to the blessing of mankind. But from this cause the dissolution of the order soon ensued. Weishaupt and Knigge, its two leaders, quarrelled. The order began to be openly denounced as dangerous, and 1784, June 22, an edict was issued by the Elector of Bavaria for its suppression, which was followed by another 1785, Mar. 2. Weishaupt was degraded and banished. He retired to Halle, where he died 1830, at the age of 83. Various other members were severely punished, and the form of justice was not strictly observed in the proceedings against them.—Great importance was at one time attached to the order of the

Illuminati, whose secret influence was regarded as a principal cause of many of the political events of the time of the French Revolution, and the works of Abbé Barruel and of Prof. Robison of Edinburgh on this subject were eagerly read; but the highly exaggerated character of the views of these writers is now generally acknowledged.

ILLUMINATION, ELECTRIC. See ELECTRICAL ILLUMINATION.

ILLUPIE. See BASSIA.

ILLUSION, n. *ĭl-lō'zhŭn* [F. *illusion*—from L. *illūsiōnem*, a mocking—from *il*, in or on; *lūdō*, I sport or play]: deceptive appearance; false show; error. ILLU'SIVE, a. *-sĭv*, deceiving by false show; false; deceptive. ILLU'SIVELY, ad. *-lī*. ILLU'SIVENESS, n. ILLU'SORY, a. *-sėr-ĭ*, tending to deceive by false appearance. ILLUSORY APPOINTMENT, legal phrase denoting a very small proportion given to one among several heirs or recipients of property; e.g., where a person has a power or faculty to divide property among several others, such as children, and he gives one or more a very small sum, and the bulk of the property to the rest. In vulgar parlance, it is like cutting off an heir or child with a shilling. In general, it is competent to make an illusory appointment, but much depends on the peculiar terms of the deed or will.—SYN. of 'illusion': deception; deceit; delusion; mockery; chimera; fallacy; hallucination.

ILLUSIONS: a wrong interpretation of an external object affecting a sense organ; a deceptive appearance; any mistaken mental construction which has reliable objective data as its point of departure (see HALLUCINATION). The central processes of illusion and hallucination are the same. In illusion there is sense organ activity stimulated by some object.

Pathological Illusions.—Some mental attitude or prepossession favors—is perhaps essential, to such illusions. Expectation is a strong factor in producing illusions of all the senses. As pathological illusions become more complex, involving delusion, it is practically impossible to distinguish them from hallucinations. Some disturbing noise, or light falling upon the eyelids of a sleeper may produce illusions woven into dreams. Fear will transform sign-boards into ghosts, and scampering rats into burglars. Illusions of this sort are more common to immature minds which lack the cold, contradicting ideas given by experience. There are sometimes illusions of orientation which are either temporary or persistent. Sometimes a given direction 'feels north' in spite of all actual knowledge to the contrary. This is, perhaps, due to some subtle associations of the present place with another place, an associative factor that proves effective in the face of numerous other contradictory factors. Other illusions are sometimes accepted as presentiments, or

forecasts of the weather, crops, etc. This is a field of psychology almost unworked and wholly unorganized into the science of consciousness.

Sensory Illusions.—These are really special (and obscure) cases of perception, not of illusion. The very nature of visual perception decrees that the rails of a railroad approach at the horizon, and we invariably see them come together in spite of Euclidian geometry. Sensory illusions are normal, constant, and common to all individuals. All the senses are subject to them. They have played a disproportionately important part in the psychology of the perceiving activity, and in the theories of special sense perception. The attention paid to illusion is due partly to its baffling nature; to its susceptibility to experiment; to the popular interest in the subject upon which all people have had daily experience; and to a conviction that the perceptual activity itself is inexplicable until a theory has been formed to cover this particular case.

The great majority of sensory illusions is based upon a discrepancy between space values in the external world and space values assigned in perception. These spatial relations may differ intrinsically; they may be relations of direction, side-by-sideness, or time-space relations. Such illusions point to the imperfect co-ordinations between our actual sense activities and our space perceptions, an inco-ordination not remarkable when we remember how inconstant and indefinite our actual space experience is. We have one set of space relations in perception, another slightly (or greatly) different set for recalled images of the same perception, and a wholly ideal set as the basis of geometry and the higher mathematics.

Illusions of Movement and Motion.—An object in motion, if it fills the visual field, appears stationary while the observer seems to move in the opposite direction. The illusion is perceived while watching a river flow. On the other hand, if the observer be on the river, or on a moving train, the scenery moves by. A large number of experiments has been made to determine the cause of this illusion. Apparatus has been invented, also, giving the illusion special forms, e.g., a card has a broad black line drawn in a concentric spiral. When the card is rotated there appears to be a coiling of the spiral from the center outward, or if the direction of the rotation be reversed the coil seems to be going inward. Some of the illusions of motion are due to the persistence of sensory effects after the stimulus has been removed. The moving pictures exhibited in vaudeville performances depend upon this fact. If the points of a pair of compasses be drawn in a parallel line on the face from ear to ear, one point on each side the mouth, the lines traced will seem to diverge at the mouth. This is supposed to be due to the greater number of nerves near

the mouth. Unconscious eye movements, especially if the eyes are not perfectly co-ordinated, give rise to illusions of movement.

Optical Illusions.—We may have optical illusions as to size, shape, color, and distance of objects. Our space perceptions depend partly upon the LOCAL SIGN (q.v.) of the organ stimulated, and partly upon past experiences. Notions of size, shape, distance, and color are modified by objects in a position to give opportunity for comparison. Also the nature of the physiological process in the sense organ does not always permit a perception perfectly true to objective reality, e.g., the phenomena of irradiation and of after-images account for the perception of the illusions produced by fireworks, moving pictures, the zoötrope, etc. A mass of literature has gathered about optical illusions. Many experiments have been devised and geometrical figures produced which give rise to illusions, but greater success has attended the production of illusions than their explanation.

ILLUSTRATE, v. *ĭl-lŭs'trāt* [L. *illustrātŭs,* lighted up, illumined—from *il,* in or on; *lustro,* I make bright or clear]: to make clear; to explain by a specific example or an analogous case; to make more intelligible by adorning with pictures, etc., as a book. ILLUS'TRATING, imp. ILLUS'TRATED, pp.: ADJ. explained more fully by means of pictures, etc. IL'LUSTRA'TOR, n. *-tėr,* one who. ILLUSTRA'TION, n. *-trā'shŭn,* explanation of what is obscure or but imperfectly understood, particularly by a picture or diagram; explanation enforced by anecdote, etc., as in a speech or sermon. ILLUS'TRATIVE, a. *-trā-tĭv,* serving to illustrate; having the quality of making clear. ILLUS'TRATIVELY, ad. *-lĭ.* ILLUS'TRIOUS, a. *-trĭ-ŭs* [F. *illustre*—from L. *illus'tris,* clear, bright]: eminent by excellence; renowned. ILLUS'TRIOUSLY, ad. *-lĭ.* ILLUS'TRIOUSNESS, n. —SYN. of 'illustrate': to elucidate; exemplify; ornament; adorn;—of 'illustrious': eminent; distinguished; prominent; famous; remarkable; conspicuous; noted; celebrated; signal; noble; exalted; glorious; splendid; luminous; brilliant.

ILLUS'TRATED PUBLICA'TIONS: remarkable feature of the literature of our times. The use of illustrations or pictorial sketches to render books more intelligible and attractive, has long been common, but has of late years been carried to an extent previously unknown. There are various methods of illustration: one is by copper or steel-plate engravings, which, being on leaves apart from the text, are executed separately; another, by wood-engravings, which, inserted as blocks in the typography, are printed as part of the work. Wood-engraving is not new, but it was little employed for general illustration until comparatively recent times. Throughout the 18th and the first quarter of the 19th c., illustrations consisted mostly of separate engravings on copper (see ENGRAV-

ING). In the early part of the 19th c., books of travels and works of a fanciful kind, also in natural history, issued in London, were illustrated chiefly by aquatint engravings. Among artists noted for this species of illustration were Rowlandson, John Clark, and the Cruikshanks, and as the engravings were colored by hand, they were particularly attractive. Clark was principally employed to illustrate voyages and travels. In the preparation of the designs, the author of the work was usually much indebted to the artist, who, in many cases, was furnished with only a few scratches to guide him in his representations. The use of aquatint engravings was at length superseded by lithography; but before this new species of illustration came greatly into vogue, wood-engraving took the place of all kinds of illustrations except that of the high-class line steel-engravings, which were still in use for costly publications. The taste for illustrated works sprang up in England, and thence extended to France, Germany and the United States. From 1820 to about 1830 was the great era of Illustrated Annuals (q.v.). The taste for these illustrated year-books ultimately wore itself out, and was succeeded by a demand for highly illustrated books of poetry by popular authors, and in the disposal of these elegant works some publishers realized handsome fortunes. Latterly, illustration has consisted for the greater part in wood-engravings, for they possess the inestimable advantage of being printed with the letter-press; and in the hands of high-class artists, the design and execution have reached extraordinary perfection. The beauty of American wood-engraving and printing is known from the monthlies, *The Century* and *Harper's;* and the *English Illustrated Magazine* follows their example. *The Illustrated News* was the first English illustrated paper. See WOOD-ENGRAVING.

ILLYRICUM, *ĭl-lĭr'ĭ-kŭm* (Gr. ILLYRIS, ILLYRIA): Roman name of a country whose limits in ancient times varied considerably; B.C. 4th c. the Illyrians, ancestors of the modern race generally known as Albanians (see ALBANIA), inhabited the whole e. coast of the Adriatic Sea and adjacent islands, with the w. parts of Macedonia as far as Epirus. Philip of Macedon conquered the country as far as the river Drilon (modern Drino), and thence arose the division into *Illyris Græca* and *Illyris Barbara* or *Romana.* The former, now Albania (q.v.), was incorporated with Macedonia. *Illyris Barbara* or *Romana* was divided into Iapydia, Liburnia, and Dalmatia. The Illyrians were addicted to piracy, which soon brought them into collision with the Romans, and led to their subjugation about two centuries before the Christian era. They made numerous efforts to shake off the Roman yoke, but were always defeated, and the country became a most important province of the Roman empire, comprising the territory represented in modern times by

Croatia, Dalmatia, Herzegovina, Montenegro, nearly all Bosnia, and a part of Albania. On the division of the Roman empire, Illyricum shared the vicissitudes that followed. A decree of Napoleon 1809, Oct. 14, gave the name Illyrian Provinces to Carniola, Dalmatia, and other countries from the Adriatic Sea to the Save, then belonging to the French empire. At his fall, these provinces were united as a kingdom to the Austrian empire, and some alterations were made in its boundaries, especially by the restoration to Hungary of what had formerly belonged to it, and the annexation of the whole of Carinthia instead. The kingdom was divided into the two govts. of Laibach and Trieste, Laibach being the capital, which arrangement subsisted till 1849, when there was a subdivision, for administrative purposes, into the duchies of Carinthia (q.v.), Carniola (q.v.), and the coast district, containing the counties of Görz (q.v.), Gradiska, and Istria (q.v.), with the city and territory of Trieste (q.v.).

ILMEN, *ĭl-mĕn'* (formerly *Moysk*): lake in n.w. Russia, govt. of Novgorod, 27 m. long, 20 m. broad, 16 ft. deep. The lake is stormy, and unfit for navigation; its bottom stony. The rivers Shelon, Lovat, Msta, and several others, flow into the lake, which discharges its waters through the river Volkhof into Lake Ladoga. The lake abounds in fish, chiefly sandres, bream, and smelt, and fishing on its banks occupies a pop. of about 20,000. The lake Ilmen is historically remarkable, because it was on its banks that the Slavonian tribes lived, who, a thousand years ago (862), invited the Variago-Russ to come and rule over them, from which time dates the origin of the Russian nation.

ILMENITE, n. *ĭl'mĕn-īt:* an ore of iron occurring in various formations—so called as found in the *Ilmen* mountains, Siberia; called also *titanic iron.* ILMENIUM, n. *ĭl-mē'nĭ-ŭm,* a hypothetical metal, analogous to tantalum—probably identical with niobium, the supposed base of ilmenic acid. ILMENIC ACID, a supposed impure niobic acid.

ILMINSTER, *ĭl'mĭn-stĕr:* small but ancient market-town of England, county of Somerset, on the right bank of the Isle, 44 m. s.w. of Bath. The Free Grammar and Commercial Schools, with an endowment of nearly £1,000 a year, were founded 1586. Some manufactures of woolens, silks, and lace are carried on. Pop. 3,000.

IL OBEID, or EL OBEID, *lō-bīd':* important trading town of Africa, cap. of Kordofan; lat. 13° 11′ n., long. 29° 35′ e.; at the foot of a long and gradually sloping plain, the drainage from which, after heavy rains, frequently inundates the principal streets. The town consists of a number of villages, originally separate, and inhabited by distinct races, but now joined together, and distinct only enough to form separate quarters. The

general appearance of the place is uninviting, gloomy, and dirty. Gum-arabic, ivory, tamarinds, and ostrich feathers are chief articles of export. Near this, 1883, a force of Egyptians under Hicks Pasha, with an English staff, was exterminated by a large army of natives under the *Mahdi,* a pretended prophet and assumed successor of Mohammed, in insurrection against the Egyptian government. Pop. estimated 30,000.

ILOILO, *ē-lō'ē-lō,* a town on the southeast coast of the island of Panay, one of the Philippine group, and about 250 miles from Manila. Iloilo is opposite the island of Guimaras and had formerly an extensive export trade in hemp, sugar, sapan-wood, and tobacco. Its harbor is well protected and naturally formed, and vessels of large draught can sail up to the mouth of the Iloilo river. Originally under Spanish control, the city was the seat of the government of the province, conducted by a lieutenant-governor who was elected for six years. With the surrender of the Philippines to the United States at the close of the SPANISH-AMERICAN WAR (q.v.) the island of Panay passed into American hands (1899).

ILORI, *ĭl-ō-rē,* or ILORIN, *ĭl-ō-rĭn,* or ALOURIE, *â-lô'rē:* large town of the Yorubasa country, w. Africa; about 60 m. s. of the Niger, 160 m. from the sea-coast. The people are Yorubas, Houssas, and Bornuese, besides numerous foreign traders. Mohammedanism is the faith of the authorities, but the people mostly are pagan. There is extensive trade with the sea-coast, and with further inland districts; and much industry in making leather goods, carved wood, pottery, and cheese. Pop. 60,000 to 70,000.

ILS'LEY, EAST: small but ancient market-town of Berkshire, England, in a secluded valley amid bleak and dreary downs, about 56 m. w. of London. It is remarkable chiefly for its sheep-markets, which are among the most important in the kingdom; 50,000 sheep have been penned for sale here in one day. The ordinary sheep-fairs are on every alternate Wednesday, from the Wednesday fortnight before Easter till July. The downs in the vicinity of the town are noted training-grounds for race-horses. About a mile distant is the village of W. Ilsley. Pop. 600.

ILVAITE, n. *ĭl'vă-īt* [*Ilva,* the old name of the island of Elba]: a mineral, a silicate of iron and lime; lievrite.

I'M, *īm:* a contraction for *I am.*

IM, *ĭm* [F. *em*—from L. *im*]: a prefix signifying *in, into, on,* and in adjectives *not* (see IN)] *Note.*—In some words *im* is a corruption of the OF. *em* by confusion with L. *im: em* has often an intensive force.

IMAGE, n. *ĭm'āj* [F. *image*—from L. *imāgō,* or *imāgĭnĕm,* an image or likeness: It. *imagine:* a representation or figure of any person or thing, as an idol; a like-

ness; a statue; a description in discourse; a picture formed in the mind; an idea; in *OE.*, show; appearance; V. to represent or form a likeness of; to imagine. IM'AGING, imp. IM'AGED, pp. *-ājd.* IMAGERY, n. *ĭm'āj-rĭ* or *ĭm'ā-jĕr-ĭ*, sensible representations; lively descriptions which suggest visible representations of objects to the mind; figures in a speech or discourse; in *OE.*, show; appearance; form. See IMAGINATION.

IMAGES, VENERATION OF, the practice of venerating and honoring in public or private graven or painted representations of sacred things or persons. Because of the general prevalence of idolatrous worship of images, the Jews in the Old Law were forbidden the making of images, although evidence of the lawfulness of the practice is afforded in the positive command to 'make two cherubim of beaten gold on the two sides of the oracle,' to 'make a brazen serpent and put it up for a sign.' The walls of the catacombs, which were the refuge of the first Christians in times of persecution, show many sacred pictures, and after the period of the persecutions the use of sacred images or paintings became open and undespised.

IM'AGE-WOR'SHIP [Gr. *iconolatria*]: use, in public or private worship, of graven or painted representations of sacred persons or things, and especially the exhibition of honor, reverence, or worship to or toward such representations. This practice, in the various degrees of which it is susceptible, has formed, for many centuries, so fruitful a subject of controversy among Christians, that it is expedient first briefly to detail the history of the use of images in Christian worship during the several periods; secondly, to state summarily the opposite views of this history which are taken by the two great parties into which Christians are divided on this question.

Neither in the New Testament, nor in any genuine writings of the first age of Christianity, can any trace be discovered of the use of statues or pictures in the public or private worship of Christians. The earliest allusion to such representations is found in Tertullian, who appeals to the image of the Good Shepherd as engraved on the chalices. A very curious pagan caricature of Christianity, of the very same age, lately discovered scratched upon the wall of a room in the palace of the Cæsars (see GRAFFITI), which rudely represents a man standing in the attitude of prayer, with outstretched hand, before a grotesque caricature of the crucifixion, and which bears the title 'Alexamenus worships God,' has been recently alleged by Rom. Catholics as an additional indication of at least a certain use of images among the Christians of the 2d c. The tombs of the Christians in the Roman catacombs, many of which are of a date anterior to Constantine, frequently have graven upon them representations of the Dove, of the

Cross, of the symbolical Fish, of the Ship, of Adam and Eve, of Moses striking the rock, of Jonas, of Daniel in the lions' den, of the apostles Peter and Paul, and, above all, of the Good Shepherd; and those compartments of the catacombs which were used as chapels are often profusely decorated with sacred representations, the age of which, however, it is not easy to determine with accuracy. But whatever opinion may be formed as to particular instances, such as these, it is admitted by Rom. Catholics themselves (who explain it by the fear of perpetuating the idolatrous notions of the early converts from paganism) that for the first three centuries the use of images was rare and exceptional; nor was it until after the establishment of Christianity under Constantine, and particularly after the condemnation of the Nestorian heresy 430, that statues and pictures of the Lord Jesus, of the Virgin Mary, and the Saints, were commonly introduced in churches, especially in the East and Italy. And yet, even in the 5th c., the practice had already reached a great height, as we learn from the church historian, Theodoret, for the East, and from Paulinus of Nola, for Italy; and in the 6th and 7th c. many popular practices prevailed, which called forth the condemnation of learned and pious bishops both in the East and in the West. It was usual not only to keep lights and burn incense before the images, to kiss them reverently, and to kneel down and pray before them, but some went so far as to make the images serve as godfathers and godmothers in baptism, and even to mingle the dust or the coloring matter scraped from the images with the Eucharistic elements in the Holy Communion! This use of images by Christians was alleged as an obstacle to the conversion of the Jews, and as one of the causes of the progress of Mohammedism in the East; and the excesses described above provoked the reaction of Iconoclasm (see ICONOCLAST, IDOLATRY). In the second Council of Nice, 787, the doctrine as to the worship of images was carefully laid down. A distinction was drawn between the supreme worship of adoration, called *latreia*, and the inferior worship of honor or reverence, called *douleia;* and still more between *absolute* worship, directly and ultimately rendered to a person or thing *in itself*, and *relative*, which is addressed only *through* a person or thing, ultimately *to* another person or thing represented thereby. The second Council of Nice declared, first, that the worship to be paid to images is not the supreme worship of *latreia*, but only the inferior worship of *douleia;* and, secondly, that it is not *absolute*, and does not rest upon the images themselves, but *relative*, that is, only addressed through them, or by occasion of them, to the original which they represent. This explanation of the doctrine and the practice was thenceforth generally received; but a strange error in the translation of the Greek acts of the Council of Nice, by which it appeared

that the same adoration was decreed by that council to images 'which is rendered to the Holy Trinity itself,' led to a vehement agitation in France and Germany under Charlemagne, and to a condemnation by a synod at Frankfurt of the doctrines of the Council of Nice. But an explanation of this error, and of the false translation on which it was based, was immediately afterward given by the pope; and eventually the Nicene exposition of the doctrine was universally accepted in the Western as well as the Eastern Church.

At the Reformation the reforming party generally rejected the use of images as an unscriptural novelty, irreconcilable as well with the prohibition of the old law as with that characteristic of 'spirit and truth' which is laid down by our Lord as specially distinctive of the new dispensation; and they commonly stigmatized the Rom. Cath. practice as superstitious, and even idolatrous. The Zwinglian, and subsequently the Calvinistic churches, absolutely and entirely repudiated all use of images for the purposes of worship. Luther, on the contrary, while he condemned the Roman worship of images, regarded the simple use of them in the church, even though only for instruction, and as incentives to faith and to devotion, as one of those *adiaphora*, or *indifferent* things, which may be permitted, though not of necessary institution; hence, in the Lutheran churches of Germany, and the northern kingdoms, pictures, crucifixes, and other religious emblems are still freely retained. In the Anglican Church, the practice is still a subject of controversy. In the Presb. Church, the Congl. churches, and in all the other Prot. communions, images are entirely unknown.

The Rom. Cath. Church, through the decree of the Council of Trent, disclaims the imputation, commonly made against Rom. Catholics, of the idolatrous worship of images, 'as though a divinity dwelt in them, or as though we asked anything of them, or trusted in them, as the heathens did in their idols.' It renews the Nicene distinction between *absolute* and *relative* worship; the latter of which alone—'whereby we worship Christ and the saints, who are the prototypes of these images'—it sanctions or permits; and it contends for the great advantage, especially for the rude and unlearned people, to be drawn from the use of pictures and statues in the churches as 'memorials of the sufferings and of the mercy of our Lord, as instructive records of the virtues of the saints, and exhortations to the imitation of their example, and as incentives to the love of God and to the practice of piety' (Sess. xxv. *On the Invocation of Saints*). In many foreign churches, especially in Italy, in s. Germany, and in France, are images popularly reputed as especially sacred, to which, or to prayers offered before which, miraculous effects are ascribed. But instructed Rom. Catholics declare that the legends connected with such images form no part of the belief of

their church. Most Rom. Cath. books of instruction contain cautions against attributing such effects to any special virtue of the images themselves, rather than to the special faith, trustfulness, and fervor which are stirred up by their presence, and by the recorded examples of the mercy of God with which they are associated in the minds of the faithful.

IMAGINARIES, in Mathematics. See COMPLEX NUMBERS.

IMAG'INARY QUAN'TITY, or IMPOSSIBLE QUANTITY, in Algebra: a root of an even negative quantity, which can be extracted only *formally*. In the working of many algebraic problems, it often happens that the root of a negative quantity must be extracted; if the root is odd, the operation can be performed (see INVOLUTION); but if even, the root can only be *formally* extracted, and is in consequence called an *impossible* or *imaginary* quantity. For instance, the cube root of -64 is not an imaginary quantity, for $-4 \times -4 \times -4 = -64$, and therefore $\sqrt[3]{-64} = -4$; but the square root of -64 is an impossible quantity, for no possible quantity (whether it be $+$ or $-$) multiplied by itself can produce a negative quantity; similarly and *a fortiori*, the fourth root of -64 is an impossible quantity, and the same is true of all even roots. Imaginary quantities are, however, generally reduced to one denomination as multiples of $\sqrt{-1}$, in the following manner: $\sqrt{-64} = \sqrt{64 \times -1} = \sqrt{64} \times \sqrt{-1} = 8\sqrt{-1}$; and again, $\sqrt{18a^5} = \sqrt{9a^4 \times -2a} = \sqrt{9a^4} \times \sqrt{2a} \times \sqrt{-1} = 3a^2\sqrt{2a}\sqrt{-1}$. These forms very frequently occur in higher algebra.

IMAGINATION, in Philosophy and Psychology, is the power which the mind possesses to form mental images. These images are derived from sense experience, but they are by no means *mere* copies of such experiences, for the mind is able to dissect and recombine old sensory events in the most elaborate way. In literature the term imagination has generally been applied to the more fanciful and æsthetic use of this imaging capacity, but the other directions in which this function is exercised are for the rank and file of men immensely more significant. All scientific investigation and invention, not to mention the common plans of everyday life, are executed by means of the use of the imagination. Psychologists sometimes for descriptive convenience distinguish between productive and reproductive imagination. The former is thought of as applying to those uses of the faculty in which the resulting imagery seems fresh and original and not merely a copy of some antecedent experience. The latter term is applied when the image appears to be simply a copy, as when we think of our own room. People differ widely both in regard to the special

images of which they make most use and as regards their ability to command at will imagery of any kind. Some persons do almost all their thinking in visual images; others use in this same relatively exclusive way auditory images. The terms 'tactiles,' 'audiles,' 'motiles,' etc., have been adopted to designate such marked types. With most of us there is a fairly developed ability to secure any of the more important forms of images, and we use the different types more or less interchangeably. Not a few persons seem to be lacking in power to get certain forms of images, however. For instance, they may be unable to get images of taste or smell. Theoretically we should have as many forms of images as we have sense processes, and this is probably roughly true for the average individual. Why certain persons have lost this capacity for certain images, or why they never had it, we cannot say.

Imagination is often spoken of as if it were concerned with the unrealities of life. This, however, is an extremely misleading conception, for we make constant use of this mental power in all our more serious undertakings. In so far as the term is synonymous with mere fancy it is, of course, justly identifiable with the more trivial aspects of life. But this is a very small part of its entire function.

IMAGINE, v. *ĭm-ăj'ĭn* [F. *imaginer,* to imagine—from L. *imagĭnārī,* to picture to one's self—from *imāgō,* an image]: to form the notion or idea of a visible object in the mind; to fancy; to scheme; to contrive. IMAG'INING, imp. forming in the mind; devising: N. the act of forming in the mind; fancy; thing imagined. IMAG'INED, pp. *-ĭnd:* ADJ. formed in the mind; contrived. IMAG'INABLE, a. *-ĭn-ă-bl* [F.—L.]: that may or can be imagined. IMAG'INABLY, ad. *-ă-blĭ.* IMAG'INARY, a. *-ĕr-ĭ,* existing only in the imagination; visionary; unreal; fancied. IMAG'INA'TION, n. *-ā'shŭn* [F.—L.]: scheme or contrivance formed in the mind; that power or faculty of the mind by which it conceives or forms ideas of things, whether existing but not present to the senses, or not existing (see below); in *OE.,* contrivance; scheme. IMAG'INATIVE, a. *-ă-tĭv,* full of imagination. IMAG'INATIVENESS, n. IMAGINARY-FOCUS, in *optics* (see FOCUS).—SYN. of 'imaginary': ideal; fanciful; chimerical;—of 'imagination': idea; fancy; device; conception; conceit; thought; —of 'imagine': to suppose; conceive; apprehend; presume; assume; think; believe; deem; plan; frame; devise; opine.

IMAGO, n. *ĭ-mā'gō* [L. *imāgō,* an image or likeness]: the third or perfect state of insects—the *larva* and *pupa* being the preceding states.

IMAM, n. *ĭ-mâm',* or IMAN, n. *ĭ-mân',* also IMAUM, n. *i-mawm'* [Ar. *imam*]: a Mohammedan bishop; a prince having supreme spiritual as well as temporal power.

Imam is commonly applied to any of the persons belonging to the Mohammedan Ulema (q.v.), or priestly body. They are distinguished from the laity by a turban somewhat higher than usual, and are held in great reverence by the people. The sultan himself has the title of Imam as the spiritual chief of all Moslems. The word is sometimes incorrectly written.

IMA'US. See HINDÚ-KÚSH.

IMBALM, IMBANK, IMBARGO, IMBARK, IMBAY. See EMBALM, ETC.

IMBAT'TLED. See EMBATTLED.

IMBECILE, n. *ĭm'bĕ-sĭl* or *-sēl* [OF. *imbecille;* F. *imbécile*—from L. *imbēcil'lŭs,* feeble]: one who is destitute of strength either of body or mind: ADJ. weak; infirm; destitute of strength of either body or mind. IM'BECIL'ITY, n. *-sĭl'ĭ-tĭ,* weakness; feebleness of body or mind; defective state of mind not amounting to idiocy. *Note.*—The OE. verb *embec'ill,* to weaken, to enfeeble, subsequently obtained the sense, 'to diminish, to subtract from,' and hence the connection of the OE. word *embecill* with the mod. Eng. *embezzle,* to purloin.—SYN. of 'imbecile, a.': feeble; impotent; debilitated; decrepit; —of 'imbecility': infirmity; debility; feebleness; impotence.

IMBECIL'ITY: weakness through imperfect development of mind; not to be confounded with idiocy, which is *non*-development of mind. In the feeble intellect, all the faculties may be present, and these may act under ordinary laws; but they are dwarfed, incapable of continued growth and training, and are exercised and applied under the guidance and assistance of others, or of external circumstances. There are large numbers of weak-minded, useless persons in every community, who differ from the more robust intellects solely in degree. But the more marked and recognizable imbecility is characterized by all or many of the following symptoms: The expression is vacant, the senses are dull; the head is small, the body deformed; the gait is vacillating and restless; the head is pendent, thrown back, or agitated; the saliva escapes; the language is limited and infantile; the ideas are few, and consist of mere sensuous impressions; the temper is timid, facile, and vain; and the passions are little susceptible of control. In a legal view, imbeciles have been divided into those who have, and those who have not, a moral perception of right and wrong. It is, however, worthy of consideration that while they may know right from wrong in their ordinary and habitual range of duties, and within the scope of their own capacity, they may fail to do so beyond these narrow limits, and where questions of property, propriety, or abstract justice are concerned. Many imbeciles are muscular, capable of performing acts requiring strength and endurance rather than dexterity; and often they are

not merely the 'naturals,' who run everybody's messages, but they are converted into the domestic drudges of the homestead and the farm. From the more clever and cunning of the class the professional fools of former ages were selected. Imbeciles are often confounded with genuine idiots, and their partial educability has exaggerated the supposed success in the attempts to elicit and mature the embryo mind.

IMBECILITY, in law—i.e., something short of idiocy or lunacy—is in most countries no ground of relief against a contract, though relief is always granted in case of fraud, and the imbecility of one of the parties may form an element of the fraud. Nor does law usually in any peculiar way protect an imbecile person or his property; for so long as a person is not actually insane or an idiot, he can do what he likes with his own. In Scotland, however, an imbecile person is to a certain extent protected against being imposed upon, as regards his heritable property, by a step called interdiction, which consists in either the imbecile, who is conscious of his weakness, executing a bond of interdiction, by which he puts himself under trustees, whose consent is in future made necessary to render valid his contracts, or he may be judicially interdicted by the court of session, at the instance of his next of kin, with like effects. See LUNACY.

IMBED. See EMBED.

IM'BER, or IM'MER. See DIVER.

IMBERBIS, a. *ĭm-bėr'bĭs* [L. *imberbis,* without a beard—from *im,* not; *barba,* a beard]: in *bot.,* smooth; without a beard.

IMBIBE, v. *ĭm-bīb'* [F. *imbiber,* to imbibe—from L. *imbĭbērĕ,* to drink in—from *im,* into; *bĭbo,* I drink]: to drink or suck in; to absorb; to receive or admit into the mind. IMBI'BING, imp. IMBIBED', pp. *bībd'.* IMBI'BER, n. *-bėr,* one who. IMBIBITION, n. *ĭm'bĭ-bĭsh'ŭn,* the act of sucking or drinking in; the action by which the passage of a fluid, or of gaseous matters, is effected through dead and living tissues; endosmosis.

IMBITTER, v. *ĭm-bĭt'tėr* [*im,* for *em,* with intensive meaning, and *bitter*]: to make bitter; to render unhappy; to render more distressing; to exasperate. IMBIT'TERING, imp. IMBIT'TERED, pp. *-tėrd:* ADJ. rendered unhappy or painful; exasperated.

IMBODY, IMBOLDEN, IMBORDER. IMBOSOM, IMBOWER, and IMBRACE: see EMBODY, EMBOLDEN, ETC.

IMBOW, v. *ĭm-bō'* [*im,* in, and *bow*]: to form like a bow; to arch; to vault. IMBOW'ING, imp. IMBOWED', pp. *-bōd'.* IMBOW'MENT, n. *-mĕnt,* an arch or vault.

IMBRICATE, a. *ĭm'brĭ-kāt,* or IM'BRICATED [L. *imbrĭcātus,* formed like a gutter-tile—from *imbrex,* a gutter-tile]: bent or hollowed like a roof or gutter-tile;

lying over each other like tiles upon a roof; in *bot.*, applied to the parts in a flower-bud which alternately overlap each other and are arranged in a spiral manner. IM'BRICA'TION, n. *-kā'shŭn*, a concave indenture like that of tiles. IM'BRICATIVE, a. *-kā-tĭv*, overlapping at the edge; denoting the condition in which the tops of the pieces composing the verticil touch.

IMBROGLIO, n. *ĭm-brōl'yō* [It.]: intricacy; a complicated plot; a complicated and embarrassing state of things.

IMBROS, *ĭm'brōs:* island of the Ægean sea, about 11 m. n.e. of Lemnos, and the same distance from the mouth of the Dardanelles. It is 18 m. in length; 98 sq.m. The island is mountainous, its highest summit being 1,845 ft. above sea-level, and is covered with wood. Corn, wine, and cotton are abundantly grown in the valleys; oil also is produced. Imbros contains four villages, the chief of which, Imbro, is built on the site of an ancient town of the same name. Pop. 6,000, mostly Greek.

IMBROWN, v. *ĭm-brown'* [*im*, for *em*, with intensive force, and *brown*]: to render brown or dirty; to obscure. IMBROWN'ING, imp. IMBROWNED', pp. *-brownd'*.

IMBRUE, v. *ĭm-brô'* [OF. *embreuver*, to moisten, to soak in—from OF., *beuvre;* It. *bevere*, to drink]: to steep, soak, or drench, usually applied to blood; to wet or moisten. IMBRU'ING, imp. IMBRUED', pp. *-brôd'*. IMBRUED, or EMBRUED, in *her.*, signifies dripping with blood. IMBRUE'MENT, n. the act of imbruing.

IMBRUTE, v. *ĭm-brôt'* [*im*, into, and *brute*]: to degrade to the state of a brute. IMBRU'TING, imp. IMBRU'TED, pp.

IMBUE, v. *ĭm-bū'* [L. *imbŭĕrĕ*, to cause to drink in, to wet or soak]: to dye; to tinge deeply; to tincture; to cause to imbibe, as the mind. IMBU'ING, imp. IMBUED', pp. *-būd'*. IMBU'MENT, n. *-mĕnt*, a deep tincture.

IMERITIA, *ē-mėr-ĭsh'ė-a:* formerly an independent Transcaucasian territory, anciently a part of Colchis, then united to Georgia (q.v.), now part of the govt. of Kutaïs (see TRANSCAUCASIA); bounded n. by the Caucasian mountains, w. by the districts of Ghuria and Mingrelia; 4,040 sq.m.; pop. 100,000. Its history as an independent dominion commenced about the beginning of the 15th c., and was long marked by internal dissensions. In 1745, Salomon I. was proclaimed, but his nobles revolting shortly after, and aided by the Turks, dethroned him. Salomon applied for help to Russia, and 1769, Count Todtleben, at the head of a Russian force, entered Imeritia, restored the king, and drove back the Turks. The civil dissensions of this province, however, continued, and at last, 1810, after having acknowledged allegiance to Russia, it was formally incorporated in and proclaimed a province of that empire.

IMIDES, *ĭ'mĭdz*, or *-mīdz*, chemical substances derived from ammonia NH_3, by replacing two of the hydrogen atoms by a divalent radical.

IMITATE, v. *ĭm'ĭ-tāt* [L. *imĭtātŭs*, imitated: It. *imitare;* F. *imiter*, to copy]: to follow, or to endeavor to follow another in manners, style, etc.; to copy generally; to counterfeit. IM'ITATING, imp. IM'ITATED, pp.: ADJ. followed; copied. IM'ITABLE, a. *-tă-bl* [F.—L.]: that may be imitated or copied. IM'ITABIL'ITY, n. *-bĭl'ĭ-tĭ*, quality of being imitable. IM'ITATOR, n. *-tā-tėr*, one who follows a pattern; a copyist. IM'ITA'TION, n. *shŭn* [F.—L.]: that which is made or produced as a copy or likeness; a copy after a form or original: the act of following in manner, etc. (see SYMPATHY): a counterfeit; a copy in inferior materials; a work of art resembling something which we know it is not. IM'ITATIVE, a. *-tĭv*, inclined to follow in manner; aiming at resemblance. IM'ITATIVELY, ad. *-lĭ*.

IMITA'TION, in the Science of Musical Composition: repeating of the same passage, or the following of a passage with a similar one, in one or more of the other parts or voices: the Imitation may be either strict or free. When the imitated passage is repeated note for note, and every interval is the same, it is called strict, and it may take place in the unison or octave, or in any other of the degrees of the scale, either above or below the original passage. The progression of a passage may be imitated also by an inversion, or by reversing the movement of the original; also by notes of a greater or of a lesser value. (See DOUBLE COUNTERPOINT; FUGUE; CANON.) Imitation in composition is one of the most important means of producing unity and animation in the progression of the parts, and is used in a strict, also in a free manner, in the instrumental works of Haydn and Beethoven, also by Mozart in his easier operatic works. Many composers, however, resort to Imitation improperly, usually from poverty of musical ideas, or from pedantry. No fixed rules can be given for its use.

IMITATION: (1) any repetition in thought or action or both which reinstates a copy. This definition includes 'self-imitation,' or imitation of what is in one's own mind. (2) The performance of an action observed in another. When the performance results from a conscious effort to copy it is 'conscious imitation.' Or the action may not be consciously imitative, as when the members of a crowd seek to carry out the ideas of their leader ('plastic imitation').

The impulse to imitate is an inherent character of human, perhaps of all animal, experience. In some people it is a dominating impulse, in others it is subordinate to impulses to originate or initiate action. Students of child psychology and of social psychology have found the imitative impulse to be of great importance in the

explanation of many groups of acts. Language, games, and much of the early information is acquired under the compelling power of the native impulse to imitate. Teachers come to rely upon this impulse as a main power in learning. This impulse serves its predominant function only in early life. As experience increases and the nervous system matures, the creative impulse increases in efficiency and reliability. Should imitative activity be required continuously at this period, individuality is stunted. Imitation in education should therefore be used intelligently.

Imitation leads to uniformity of action; it is the great conservative factor in racial psychology. While radical acts are sometimes performed under the impulse to imitate, the impulse in itself prevents individual variation. The French school of social psychology regards imitation, perhaps rightly, as the great social phenomenon. Adherence to custom, following the fashions, the search for precedents,—in every social activity, in fact, imitation is a determining impulse. See MIMICRY and MIMETISM.

IM'ITATIVE INSAN'ITY: mental disease propagated by imitation or through sympathy. There are many mental diseases, especially those marked by grotesque external manifestations, by gesticulations, and convulsive seizures, which appear to be so propagated. In the healthy and naturally constituted, there exists a tendency to copy and reproduce, or represent, what powerfully impresses the imagination; and during the excitement of individuals or communities, this inclination is more influential, and may pass beyond the control of the will. (See SYMPATHY.) Great caution, however, must be exercised in distinguishing between what is epidemic and dependent on external moral causes, from the results of morbid states of the mind itself. An idiot is mentioned by Gall, who, having seen the slaughter of a pig, killed a man after the same fashion. A child of seven years old suffocated a younger brother on the suggestion of the strangling of Punch at the hands of the devil. The example of suicide by hanging having been set by a pensioner in the Invalides in Paris, six similar deaths followed, and by suspension from the same lamp-post. The publication in sensational newspapers of the details of some unusual crime is often followed by the discovery of crimes of a similar nature, the perpetrators of which are driven thereto by an impulse of imitation.

IMMACULATE, a. *ĭm-măk'ū-lāt* [L. *immaculatus*, unstained—from *im*, not; *măcūlă*, a spot: It. *immacolato:* F. *immaculé*]: spotless; pure; unstained. IMMAC'ULATELY, ad. *-lĭ*. IMMAC'ULATENESS, n. IMMACULATE CONCEPTION, the doctrine that the Virgin Mary was born without original sin—held in the R. Cath. Church.

IMMAC'ULATE CONCEPTION OF THE BLESSED VIRGIN MARY, FEAST OF: festival celebrated Dec. 8,

in the Latin, and Dec. 9 in the Greek Church, in which latter church it is held under the name of 'The Conception of St. Anne,' mother of the Virgin Mary. The festival of the Conception itself is traceable in the Greek Church from the end of the 5th c., and in the Latin dates from the 7th c.; but a great controversy prevailed long in the West as to whether and in what sense the conception of the Virgin Mary was to be held immaculate, and in what sense the Virgin herself was to be held conceived without sin. It was believed to be a consequence of the doctrine of the divine maternity, and a necessary part of the honor due to the Incarnation, that the Blessed Mother should be held to have been at all times free from the stain of sin. This might have been, either by her having been, like the prophet Jeremiah (Jer. i. 6), or John Baptist (Luke i. 35), sanctified before her birth—that is, purified in her mother's womb from the stain of original sin; or by the still higher sanctification of having been entirely exempted from the stain of sin, either—for the discussion was carried to all these subtleties—before the formation of the embryo in the womb of her mother, or at least before its animation by union with the soul. The actual controversy in the West may be said to have commenced with St. Bernard, who not only remonstrated with the canons of Lyon, 1131, for their unauthorized introduction of this festival in their cathedral, but rejected the opinion of the Virgin's having been conceived free from original sin, though he admitted her sanctification in her mother's womb (*Epist.* 174, *Ad Canon. Lugdunensis*). The discussion thus raised led to a protracted controversy in the schools. The great master of scholastic subtlety, John Duns Scotus, in a disputation before the Univ. of Paris, 1307, maintained the doctrine of the Immaculate Conception in its highest sense; and the entire order to which he belonged, the Franciscan, as well as the school to which he has given his name, the Scotists, afterward zealously defended it. On the other hand, the Thomist school, which was that of the Dominican order, having denied the Immaculate Conception, much division for a time existed; but the prevailing tendency was at all times toward the Scotist opinion. The Univ. of Paris, 1387, condemned the Thomist doctrine. The Council of Basel—though, it is true, at the time when it was in conflict with the pope—declared the doctrine of the Immaculate Conception to be a dogma of the church, and reprobated in the strongest terms the opposite opinion. Sixtus IV., however, imposed on the defenders of both opinions, 1470, the obligation of mutual toleration and charity, and renewed this constitution, 1483; but in the end of the same century the Univ. of Paris required, as a condition of the doctorate, an oath on the part of the candidate that he would defend the dogma of the Immaculate Conception. The Council of Trent, without discussing the scholastic dis-

pute, merely declared that 'in its decree on original sin it did not comprehend the blessed and immaculate Virgin Mary,' and renewed the constitution of Sixtus IV. above referred to. This abstinence on the part of the council led to further renewal of the dispute, which reached such a pitch toward the close of the 16th c. that Pius V. not only prohibited either side from stigmatizing the opposite with the name of heretical, but forbade all public discussion of the subject, except in theological disputations in the presence of a learned auditory. In the pontificates of Paul V. and Gregory XV., earnest instances were made by the Spanish crown to obtain a definite declaration in favor of the doctrine of the Immaculate Conception; but the pope again refused, contenting himself with repeating the constitution of Sixtus IV. He added, however, certain new provisions: (1) That disputants, in asserting the doctrine of the Immaculate Conception, should abstain from assailing the opposite doctrine. (2) That no one except the members of the Dominican order, and others specially privileged, should presume to defend, even in private disputation, the doctrine that the Blessed Virgin Mary was conceived in original sin. (3) That, nevertheless, in the public mass or office of the church, no one should introduce into the prayers or other formularies any other word than simply *conceptio,* without adding any epithet involving either doctrine. At the same time, opinion was setting steadily in favor of the doctrine of the Immaculate Conception. Alexander VII., and afterward Clement IX., added new solemnity to the festival. Clement XI. ordained that it should be observed as a holiday of obligation, and at length Gregory XVI. permitted that the epithet immaculate should be introduced into the public service. In the end, at the instance of bishops in various parts of the church, Pope Pius IX. addressed a circular to the bishops of each nation, calling for their opinion, and that of their people, as to the faith of the church on the point; and on the receipt of replies nearly unanimous, he issued a solemn decree at Rome, in a numerous council of bishops, 1854, Dec. 8, declaring the doctrine to be an article of belief, and proposing it as such to the universal church. This decree has been implicitly accepted throughout the Roman Church.

IMMANENT, a. *ĭm'mă-nĕnt* [L. *im,* in; *manens,* or *manen'ten,* remaining or abiding]: inherent; abiding; intrinsic.

IMMANUEL, n. *ĭm-măn'ū-ĕl* [Heb.—made up of *im,* with, *anu,* us, and *êl,* God]: God with us; a title of Jesus Christ as the son of God, and the Saviour; also EMMAN'UEL (q.v.).

IMMARCESSIBLE, a. *ĭm'mâr-sĕs'sĭ-bl* [L. *im,* not; *marces'cĕre,* to wither or pine away]: in *OE.,* unfading.

IMMATERIAL, a. *ĭm'mă-tē'rĭ-ăl* [F. *immatériel*—

from mid. L. *immatērĭālis*, immaterial—from *im*, not; *matĕrĭă*, matter]: not consisting of matter; unsubstantial; spiritual; unimportant. IM'MATE'RIALIZED, a. *-īzd*, spiritualized. IM'MATERIALISM, n. *-ĭzm*, the doctrine of the existence or state of spiritual beings; the doctrine which denies the existence of matter. IM'MATE'RIALIST, n. *-ĭst*, one who professes the doctrine of. IM'MATE'RIALLY, ad. *-lĭ*. IM'MATE'RIAL'ITY, n. *-ăl'ĭ-tĭ* [F. *immatérialité*]: the quality of not consisting of matter; distinctness from body or matter.—SYN. of 'immaterial': insignificant; inconsiderable; trifling; trivial; frivolous; futile; unessential; irrelevant; petty; incorporeal; disembodied.

IMMATERIAL AVERMENT: in pleading, a statement of unnecessary particulars sometimes included in connection with, or as description of, what is actually material to the case.

IMMATURE, a. *ĭm'mă-tūr* [L. *immatūrŭs*, not arrived at full growth—from *im*, not; *matūrus*, ripe]: that has not arrived at a perfect state; unripe; not perfect; too early; also IMMATURED, a. *ĭm'mă-tūrd*. IM'MATURELY, ad. *-lĭ*. IM'MATU'RITY, n. *-tū'rĭ-tĭ*, and IM'MATURE'NESS, n. *-tūr'-nĕs*, unripeness; the state of that which has not arrived at perfection.—SYN. of 'immature': early; premature; imperfect; hasty; incomplete.

IMMEASURABLE, a. *ĭm-mĕzh'ûr-ă-bl* [*im*, not, and *measurable*]: that cannot be measured or fathomed; immense. IMMEAS'URABLENESS, n. *-bl-nĕs*, state of being incapable of measure. IMMEAS'URABLY, ad. *-ă-blĭ*. IMMEAS'URED, a. *-ūrd*, in *OE.*, unmeasured.

IMMEDIACY, n. *ĭm-mē'dĭ-ă-sĭ* [see IMMEDIATE]: in *OE.*, power of acting without dependence or intervention; personal greatness.

IMMEDIATE, a. *ĭm-mē'dĭ-āt* [F. *immédiat*—from mid. L. *immĕdĭātus*, immediate—from L. *im*, not; *mĕdĭŭs*, middle]: without delay; instant; without the intervention of time; not acting by second causes. IMME'DIATELY, ad. *-lĭ*, without the intervention of any other cause or event; instantly. IMME'DIATENESS, n.—SYN. of 'immediately': directly; instantly; quickly; presently; proximately.

IMMEDICABLE, *a.* *ĭm-mĕd'ĭ-kă-bl* [L. *im*, not; *mĕdĭcābĭlĭs*, that can be healed or cured]: that cannot be healed or cured.

IMMEMORIAL, a. *ĭm'mĕ-mō'rĭ-ăl* [L. *im*, not, and *memorial:* F. *immémorial*, immemorial]: beyond memory; whose beginning cannot be remembered or traced; in *Eng. law*, long ago, arbitrarily fixed at the reign of Richard I.; in *Scot.*, before forty years ago. IM'MEMO'RIALLY, ad. *-lĭ*.

IMMENSE, a. *im-mĕns'* [F. *immense*—from L. *immensus*, boundless, endless—from *im*, not; *mensus*, measured: It. *immenso*]: very large; enormous; boundless.

IMMENSE'LY, ad. *-lĭ.* IMMENSE'NESS, n. the state of being immense; unbounded extent; immensity. IMMEN'SITY, n. *-mĕn'sĭ-tĭ* [F. *immensité*]: vastness in extent or bulk; an extent that cannot be measured.—SYN. of 'immense': infinite; immeasurable; illimitable; unbounded; unlimited; interminable; prodigious; vast; monstrous; huge.

IMMENSURABLE, a. *ĭm-mĕn'sūr-ă-bl* [L. *im,* not; *mensūrā,* a measure]: not to be measured. IMMEN'SURABIL'ITY, n. *-bĭl'ĭ-tĭ,* not being capable of measurement.

IMMERGE, v. *ĭm-mėrj'* [F. *immerger,* to immerse—from L. *immer'gĕrĕ,* to plunge or sink into—from *im,* into; *mergo,* I plunge in]: to plunge into or under, as under a liquid; to dip. IMMERG'ING, imp. IMMERGED', pp. *-mėrjd'.*

IMMERMANN, *ĭm'mėr-mân,* KARL LEBERECHT: 1796, Apr. 24—1840, Aug. 25; b. Magdeburg, Germany; dramatist. He was educated in the universities of Halle and Jena, entered the Prussian judiciary service, and while employed in Magdeburg, Münster, and Düsseldorf engaged in dramatic and poetic composition, managed the Düsseldorf Theatre 1834-38, and afterward resumed judicial life. He had high conceptions of art, pure taste, and great enthusiam, all far ahead of his time. His chief comedies are *Das Auge der Liebe* (1824) and *Die Schule der Frommen* (1829): tragedies, *Alexis* (1832) and *Ghismonda* (1839); romances, *Epigonen* (1836) and *Münchhausen,* 4 vols. (1838-9). He also wrote fairy tales and several volumes of poetry.

IMMERSE, v. *ĭm-mėrs'* [L. *immersus,* plunged or sunk into (see IMMERGE)]: to plunge into or under, as into a liquid; to overwhelm; to engage deeply, as in business. IMMERS'ING, imp. IMMERSED', pp. *-mėrst':* ADJ. in *bot.,* growing entirely under water—applied to the leaves of aquatic plants; having one part or organ completely embedded in another. IMMER'SIBLE, a. *-sĭ-bl,* that may be immersed. IMMER'SION, n. *-mėr'shŭn* [F.—L.]: the act of plunging into a liquid till covered; state of being immersed; baptism by plunging into water; in *astron.,* the approach of one celestial body into such a position with respect to another as apparently to sink into it and disappear; the entrance of the moon into the earth's shadow in an eclipse.

IMMETHODICAL, a. *ĭm'mĕ-thŏd'ĭ-kăl* [*im,* not, and *methodical*]: having no method; without systematic arrangement; confused. IM'METHOD'ICALLY, ad. *-lĭ.*—SYN. of 'immethodical': disorderly; irregular; unsystematic.

IMMIGRATE, v. *ĭm'mĭ-grāt* [L. *immigrātus,* removed into—from *im,* into; *migrō,* I migrate or wander: It. *immigrare*]: to pass or remove into a country for permanent residence—applied to persons in regard to the country in which they settle. IM'MIGRATING, imp. IM'MIGRATED, pp. IM'MIGRANT, n. *-grănt,* a person who

comes into a country for permanent residence—spoken of persons in regard to the country in which they settle; opposite of *emigrant*, one who removes out of a country. IM'MIGRA'TION, n. *-grā'shŭn*, removing into a country for permanent residence.

IMMIGRATION INTO THE UNITED STATES: The first legislation in the United States on the subject of immigration was of 1819, March 2, and merely provided that a record should be kept of the number of passengers arriving in each customs district, with their sex, age, occupation, and country of birth. For many years there was no thought of anything but exultation in the number of arrivals, as increasing the wealth of the country, and providing an asylum for the poor and oppressed. Even the Know-Nothing agitation of the fifties, prompted by political reasons, led to no restrictive legislation. In 1864 the first immigration act was passed by Congress, and was to promote and not restrain it; this was repealed 1868. Several states established immigration bureaus to encourage it and draw it their way. On Aug. 3, 1882, the first restrictive act was passed, but only to bar out criminals, insane, paupers, etc. Head taxes were imposed as a fund for relieving the distressed, etc. Foreign convicts (non-political), lunatics, idiots, and those liable to be a public charge, were to be returned at the expense of the owners of vessels on which they came. The secretary of the treasury was empowered to carry it out and make suitable regulations, and to make contracts with the state officials. On Feb. 26, 1885, a more drastic one was passed, which was well meant, but from its sweeping character has been, as enforced by fanatical or interested persons, the source of much useless hardship, and has tended to make the country ridiculous. This was to prohibit any laborer coming over under contract to work; it did not except professional men or skilled laborers, and while it was aimed at strike-breakers and cheap gangs, was enforced against artists, musicians, architects, etc., and even clergymen, to the discredit of the country's good sense. It has since been somewhat modified. In 1891 the act of 1882 was extended to other classes, and to all 'assisted' immigrants not affirmatively shown to be without the terms of the act. This act took the entire matter into the hands of the general government. The act of 1903, March 3, still further amended it by requiring a preliminary inspection at point of departure, and giving the government the right to deport the immigrant landed in defiance of the act within two years after arrival; it also extended to all persons advocating the overthrow of all governments and the assassination of public officials. Regarding crime, the usual statistics are misleading both for and against the immigrants. On the one hand, they restrict the records to the serious crimes, in which the native-born 'tough,' from

his rearing and training into thorough knowledge of his surroundings, and superior chances of escape, naturally takes the lead; while the foreigner, from his great predominance among those with short sentences, seems to swell heavily the volume of petty crime. On the other hand, the statistics of crime are for the whole population, not for the adult males of youth and middle age, who mainly commit it; on the same basis, the foreign portion makes no worse showing than the native.

The Law of 1907.—By the provisions of an act of Congress which took effect 1907, July 1, the tax levied upon every alien entering the United States is $4, instead of $2 as heretofore. This law provides that the tax shall not be levied upon aliens who shall enter the United States after an uninterrupted residence of at least one year immediately preceding such entrance in Canada, Newfoundland, Cuba, or Mexico. Others exempt are such as are otherwise admissible residents of any possession of the United States, and aliens who have been lawfully admitted to the United States and who later go in transit from one part of the United States to another through foreign contiguous territory. Aliens arriving from Guam, Porto Rico, or Hawaii are excluded from the above exemption provisions, under special conditions.

The exclusives include, under the law of 1907, imbeciles, feeble-minded persons, epileptics, persons afflicted with tuberculosis and persons not in the above and other named classes who are found by the examining surgeon to be mentally or physically defective, such mental or physical defect being of a nature which may affect the ability of such alien to earn a living. Persons who admit having committed a felony or other crime or misdemeanor involving moral turpitude are excluded by the new law, also persons who admit their belief in the practice of polygamy; women or girls coming for the purpose of prostitution or for any other immoral purpose; persons who procure or attempt to bring in those of this last named class and persons called contract laborers, coming under some inducement.

An important provision of the Act of 1907 is that which declares 'Wherever the President shall be satisfied that passports issued by any foreign government to its citizens to go to any country other than the United States, or to any insular possession of the United States, or to the canal zone, are being used for the purpose of enabling the holders to come to the continental territory of the United States to the detriment of labor conditions therein, the President may refuse to permit such citizens of the country using such passports to enter the United States.'

For statistics, see *Monthly Summary of Commerce and Finance*, by the government; and U. S. Census, 1890 and 1900. See also *Reports of the United States Industrial Commission on Immigration*, and the article *Restriction*

of Immigration, by Francis A. Walker, in the *Atlantic Monthly*, LXXVII., 23.

IMMINENT, a. *ĭm'mĭ-nĕnt* [F. *imminent*—from L. *imminen'tem*, hanging down or over, threatening by its nearness—from *im*, in or on; *minērĕ*, to jut, to project: It. *imminente*]: impending; threatening; at hand; near. IM'MINENTLY, ad. *-lĭ*. IM'MINENCE, n. *-nĕns* [F.—L.]: that which is imminent; a threatening.

IMMISCIBLE, a. *ĭm-mĭs'sĭ-bl* [F. *immiscible*—from L. *im*, not; *miscērĕ*, to mix, to mingle]: in *OE.*, that cannot be mixed or mingled.

IMMITIGABLE: for UNMITIGABLE, which see; incapable of being mitigated or softened.

IMMOBILITY, n. *ĭm'mō-bĭl'ĭ-tĭ* [F. *immobilité*—from L. *immōbilitātem*, immovableness—from *im*, not; *mōbĭlĭs*, movable]: fixedness in place or state; want of motion, or resistance to it.

IMMODERATE, a. *ĭm-mŏd'ĕr-āt* [L. *immŏdĕrātus*, without measure, unrestrained—from *im*, not; *modĕrātus*, moderate: F. *immodéré*]: exceeding just or usual bounds; excessive. IMMOD'ERATELY, ad. *-lĭ*. IMMOD'ERA'TION, n. *-ā'shŭn*, and IMMOD'ERATENESS, n. want of moderation; excess.—SYN. of 'immoderate': inordinate; exorbitant; unreasonable; extravagant; intemperate.

IMMODEST, a. *ĭm-mŏd'ĕst* [F. *immodeste*, immodest—from L. *immŏdes'tus*, unrestrained—from *im*, not; *modes'tus*, modest: It. *immodesto*]: wanting in decency and delicacy; unchaste; impure; obscene. IMMOD'ESTLY, ad. *-lĭ*. IMMOD'ESTY, n. *-ĕst-ĭ* [F. *immodestie*]: want of delicacy or decent restraint; indecency.—SYN. of 'immodest': indecorous; indelicate; impudent; shameless; indecent; lewd.

IMMOLATE, v. *ĭm'mō-lāt* [L. *immŏlātus*, offered or sacrificed—from *im*, in or on; *mŏlă*, meal or coarse flour mixed with salt and thrown upon sacrifices—*lit.*, to put meal on a sacrifice]: to sacrifice; to offer in sacrifice; to kill, as a victim offered in sacrifice. IM'MOLATING, imp. IM'MOLATED, pp. *-lā-tĕd*, offered in sacrifice. IM'MOLATOR, n. *-tĕr*, one who. IM'MOLA'TION, n. *-lā'shŭn* [F.—L.]: the act of sacrificing; a sacrifice offered.

IMMORAL, a. *ĭm-mŏr'ăl* [F. *immoral:* L. *im*, not, and *moral*]: contrary to the divine law; vicious; wicked or unjust. IMMOR'ALLY, ad. *-lĭ*. IMMORALITY, n. *ĭm'mō-răl'ĭ-tĭ* [F. *immoralité*]: any act contrary to the divine law; vice; wickedness.—SYN. of 'immoral': depraved; impure; unchaste; dissolute; obscene; debauched; licentious; abandoned; profligate; dishonest; unjust; wicked.

IMMORAL'ITY, in Law: a good defense to actions and suits, but it must be some immorality which runs counter to the well-known policy of the law. Thus, e.g., if a man gave a bond, or granted a deed, giving to a woman some annuity, with a view to induce her to live in

concubinage, this would be a good defense against the bond or deed being enforced, for the law discountenances his conduct; whereas, if it were merely a bond, or a gift, in consideration of something of the same kind past and ended, the deed would be good. So the keeper of a house of ill-fame is not allowed to sue, and has no legal remedy against guests for any sum agreed to be paid for immoral purposes. In most other respects, the mere personal immorality of the parties who are litigants makes no difference whatever as to their respective remedies, for the law protects the bad as well as the good.

IMMORTAL, a. *ĭm-mŏr'tăl* [F. *immortel*—from L. *immortālĭs,* imperishable—from *im,* not; *mortālis,* subject to death: It. *immortale*]: exempt from death; imperishable; never-ending: N. one who is not liable to death; a divine being; a god or goddess. IMMOR'TALLY, ad. *-lĭ.* IM'MORTAL'ITY, n. *-tăl'ĭ-tĭ* [F. *immortalité*]: undying life; existence not limited; exemption from oblivion, as a poem. IMMOR'TALIZE, v. *-īz,* to render immortal; to cause to live or exist while the world endures. IMMOR'TALI'ZING, imp. IMMOR'TALIZED, pp. *-īzd.* IMMOR'TALS, n. plu. *-ălz,* a choice body of 10,000 foot-soldiers, so named by the anc. Persian kings, and forming their body-guard. The name is also given humorously to the members of the French Academy.—SYN. of 'immortal, a.': everlasting; endless; incorruptible; deathless; perpetual; ceaseless; continual; enduring; eternal.

IMMORTAL'ITY: continued existence of the human soul in a future state, and in a sphere now invisible, for ever free from the invasion of death. A distinction, often neglected, should be made between a mere future life, and immortality proper, or the life that is eternally secure from death. 'If a man die, shall he live again?' is a question which has naturally agitated the heart and stimulated the intellectual curiosity of man, whenever he has risen above a state of barbarism, and begun to exercise his intellect at all. The religion of all civilized peoples may be said more or less to recognize the affirmative of the question, is there for man a life after the death of the body?—though often under very vague and materialistic forms. Some of the most widely spread forms of belief in the world seem exceptions to this statement; for in Hinduism, the goal sought is absorption into the Universal Spirit, and therefore loss of individual existence, i.e., of the soul; while the pious Budhist strives for *Nirvana,* which is either complete extinction, or a state difficult to be distinguished from extinction in the Western mind. Yet even here the belief in a future life (though not in immortality) exists in the form of the Transmigration of Souls (q.v.). In the ancient Egyptian religion, the idea of immortality (at least so far as that idea is involved in the idea of *a life to come*) first assumes definite shape. There is a clear recognition of a dwelling-place of the dead and of a future judgment. Osiris, having weighed the hearts of the dead in the

scales of justice, he sends the wicked to regions of darkness while the just are sent to dwell with the god of light.' The just, we read on an inscription, 'found favor before the great God; they dwell in glory where they live a heavenly life; the bodies they have quitted will forever repose in their tombs, while they rejoice in the life of the supreme God.' I. is plainly taught, but bound up with the idea of the preservation of the body, to which the Egyptians attached great importance, as a condition of the soul's continued life; hence they built vast tombs and embalmed their bodies, as if to last forever. In the Zoroastrian religion, the future world, with its governing spirits, fills a prominent part. Under Ormuz and Ahriman, there are ranged regular hierarchies of spirits engaged in perpetual conflict; and the soul passes into the kingdom of light or of darkness, over which these spirits respectively preside, according as it has lived well or ill on the earth. Whoever has lived in purity and has not suffered the *divs* (evil spirits) to have any power over him, passes after death into the realms of light. In the early Grecian paganism, Hades or the realms of the dead, is the emblem of gloom to the Hellenic imagination. 'Achilles, the ideal hero, declares that he would rather till the ground than live in pale Elysium.' This melancholy view of the future everywhere pervades the Homeric religion. With the progress of Hellenic thought, a higher idea of the future is found to characterize both the poetry and philosophy of Greece, till in the Platonic Socrates, the conception of I. shines forth with a clearness impressive in contrast with the almost universal dimness and vagueness of the pagan thought on this question. In the *Apology* and the *Phædo*, Socrates discourses of the doctrine of the soul's I., in language rich in faith and in beauty 'The soul, the immaterial part, being of the nature so superior to the body, can it,' he asks in the *Phædo*, 'as soon as it is separated from the body; be dispersed into nothing and perish? Oh, far otherwise. Rather will this be the result. If it take its departure in a state of purity, not carrying with it any clinging impurities of the body, impurities which during life it never willingly shared in, but always avoided, gathering itself into itself, and making the separation from the body its aim and study—that is, devoting itself to true philosophy, and studying how to die calmly; for this is true philosophy, is it not?—well, then, so prepared, the soul departs into that invisible region which is of its own nature, the region of the divine, the immortal, the wise; and then its lot is to be happy in a state in which it is freed from fears and wild desires, and the other evils of humanity, and spends the rest of its existence with the gods.' Such clearness of belief, however, was shared by very few of the ancient philosophers, and scarcely at all by men at large; though doubtless the natural human yearning for I. made always some vague and feeble assertion of itself.

It is only in Christianity that I. as the higher life beyond all death is clearly revealed as a reward not merely to the true philosopher as according to the view of Socra-

tes, but to every humble and godly soul. Christ 'hath brought life and immortality to light by the gospel.' 'God, according to his great mercy, begat us again unto a living hope by the resurrection of Jesus Christ from the dead, unto an inheritance incorruptible and undefiled, and that fadeth not away, reserved in heaven.' It is undoubtedly owing to Christianity that the doctrine of the souls I. has become a common and well-recognized truth—no mere result of speculation, nor product of priestly invention—but a light to the reason, and a guide to the conscience and to the conduct. The vague aspirations of philosophy, and the gross conceptions of mythology, are found in the gospel transmuted into an authoritative influence, governing and directing the present life. The Scriptures confine their direct and unqualified assertions of deathlessness to the godly; while they predict 'death' for the ungodly. But the nature of this 'death' is not revealed; and it is asserting more than we can now know to assert that it is extinction of being. On both sides of this question it is wise for us to limit our positive assertions to our actual knowledge. If we follow the Scriptures in our use of words—while we may not deny some kind of continued and even unending existence to all men—we shall apply the term Immortality (freedom from death) only to the godly.—See HEAVEN: HELL.

IMMORTELLE, n. *ĭm′mŏr-tĕl′* [F.: see IMMORTAL]: the flower commonly called *everlasting-flower;* a wreath made of these flowers. See EVERLASTING FLOWER.

IMMOVABLE, a. *ĭm-môv′ă-bl* [L. *im*, not, and *movable*]: that cannot be moved from its place; fixed; unalterable; steadfast as regards purpose. IMMOV′ABLY, ad. *-blĭ.* IMMOV′ABLENESS, n. *-bl-nĕs*, state of being immovable. IMMOV′ABIL′ITY, n. *-bĭl′ĭ-tĭ*, incapability of being moved. IMMOV′ABLES, n. plu. *-ă-blz*, lands; houses: fixtures.

IMMUNITY, n. *ĭm-mū′nĭ-tĭ* [F. *immunité*—from L. *immūnĭtātĕm*, freedom or exemption—from *im*, not; *mūnŭs*, service, duty: It. *immunita*]: exemption from any obligation, duty or danger; freedom; particular privilege. Adj. IMMUNE.

IMMUNITY, *im-mū′nĭ-tĭ*, n. [L. *immunita(t-)s*, *immunis*, exempt, in, not, + *munus*, service]: immunity refers to a special resistance to infection. Although it originally referred to exemption from public service or tribute, and although the name is still employed in the same sense, it is beginning to become more and more limited, so that at the present time the word is properly employed to designate a special resistance to infection. It is the opposite of susceptibility to disease processes. Immunity may be natural or acquired. Natural immunity refers to an immune condition existing from the beginning of an individual's life. Thus, for example, the human being is immune to a number of infectious diseases affecting animals, such as hog cholera, chicken cholera, etc., on the other hand the lower animals are immune to such diseases

as leprosy, scarlet fever, measles, etc. Such a condition is really inherited, and therefore natural immunity has often been considered as synonymous with hereditary immunity. Yet it is possible to make a slight distinction in that, for instance, a person may not be capable of contracting scarlet fever, i. e., he is naturally immune to that infection, yet it may be that his parents or his brothers and sisters are susceptible. Here we have an example of natural immunity which is not inherited. Racial immunity is a form of natural immunity. It refers to the special immunity of certain races to certain diseases,—thus the negro is more immune to yellow fever than the white man.

Acquired immunity refers to a condition of special resistance to disease developed during the life time of the individual. It may be ante-natal, i. e., acquired before birth, during the period of intra-uterine life. Thus smallpox may be transmitted from the mother to the child before birth, and since one attack of that disease produces immunity such a child is, during the remainder of his life, practically immune to smallpox. This is sometimes falsely spoken of as hereditary immunity, but the transmission was not through the germ plasm but an accidental one. Ordinarily when we speak of acquired immunity we refer to the post-natal form, i. e., acquired after birth.

Again immunity may be divided into unintentional and intentional or artificial. Unintentional immunity develops as the result of a previous attack of the disease. Most infectious diseases are followed by an immunity of greater or lesser duration. In some instances a single attack confers an immunity which lasts practically a lifetime. Among such diseases are smallpox, measles, scarlet fever, mumps, whooping cough, chicken pox and typhoid fever. It is seldom that these diseases are contracted more than once, and if contracted a second or third time as occasionally happens, these subsequent attacks are usually very mild. Other diseases such as pneumonia, diphtheria, influenza, etc., are followed by an immunity of only a few months' duration. After that time the patient is again susceptible to infection. In a few cases as erysipelas and gonorrhœa, practically no immunity is established and the diseased condition of the tissue produced during the first attack leaves the part in a state of lowered vitality, and thus predisposes to subsequent attacks.

Intentional or artificial immunity refers to that which is artifically produced. Such may be produced actively by the injection into the body of the disease-producing organism in an attenuated state; or passively by injecting the body with the serum of an animal that has first been actively immunized by injection with the specific micro-organism. One of the best examples of active intentional or artificial immunity is vaccination against smallpox by the use of vaccine obtained from lesions produced on cattle, called cowpox. Smallpox and cowpox

are essentially the same disease processes, differing only in that cattle are not so susceptible to the infection, and are therefore only slightly affected as compared with the lesions produced by smallpox in the human being. By being cultivated in the body of the cow for some time the germ of smallpox loses some of its virulence, so that later when introduced into the human being it is not sufficiently strong to produce a case of true smallpox, but produces smallpox in a mild form called vaccinia or vaccination; yet this mild form is sufficient to produce immunity against a severe form, at least for a number of years. The history of the discovery of vaccination is exceedingly interesting and the name of the discoverer, Edward Jenner, stands out clearly among the names of the greatest benefactors of the human race. It is not alone in smallpox that vaccination is found to be useful. It has also been successfully applied in such diseases as anthrax, chicken cholera, hog-cholera, symptomatic anthrax or black leg, hydrophobia, Asiatic cholera, bubonic plague and more recently in typhoid fever, tuberculosis and also in the ordinary infections accompanied by pus formation or suppuration. One of the best examples of passive intentional or artificial immunity is the use of antitoxic serum for diphtheria. There is in all medicine no better example of a specific for a disease than is antitoxin for diphtheria. Its use has caused one of the most deadly and fatal diseases to become an infection which, with prompt and proper treatment, is usually comparatively mild. The name of its discoverers, Von Behring and Roux, should be given a most important place in the list of the world's benefactors. Diphtheria antitoxin (as other antitoxic sera) is prepared as follows: The diphtheria bacillus is cultivated in bouillon for 5 to 10 days, then filtered. A small amount of the filtrate which contains the toxin of the diphtheria bacillus, is next injected into a horse. This animal is repeatedly injected at intervals of about a week for two for three months, a larger dose of the diphtheria toxin being used each time. During this entire time there has been a reaction in the body of the horse, as a result of which the body has manufactured substances which neutralize the toxin or poison of the diphtheria bacillus. This substance is called antitoxin. At the end of several months several quarts of blood are withdrawn from the horse, allowed to coagulate and the serum to separate. This serum is then collected in perfectly clean sterilized glass vessels and represents the antitoxin that is used for the treatment and prevention of diphtheria. Antitoxic immunity is also of great value in the treatment of tetanus and of some value in the treatment of erysipelas and several other diseased conditions.

Theories of Immunity.—That immunity occurs and can be developed there is absolutely no doubt. Just how it is produced, however, is not definitely known. A number of theories have been expounded, among the more important of which are the following:

1. *Exhaustion theory,* according to which the growth of bacteria in the body exhausts the body of a certain supply of something or some condition necessary for the growth of bacteria.

2. *Retention theory,* according to which the growth of bacteria in the body produces a substance which is in itself noxious to bacteria and the retention of which prevents their further growth.

3. *Acquired tolerance theory,* according to which the tissues become accustomed to the presence and action of bacteria and after acquiring such tolerance are no more affected by them.

These three theories are all somewhat antiquated and cannot withstand the criticism of modern investigation. The following three theories, however, are of much more significance:

4. *Humoral theory.* We know that the blood serum and other fluids of the body have under normal conditions, antagonistic or bactericidal properties. It is also known that during the course of infection these properties are increased. According to the humoral theory it is the increase of these properties called 'defensive proteids' that is responsible for the immunity.

5. *Phagocytic theory.* This theory, promulgated by that great and arduous worker, Metchnikoff, is based on the principle that the white blood corpuscles or leucocytes have the power of ingesting foreign substances such as bacteria and then destroying them by the process of digestion or carrying them out of the system. When engaged in this process the leucocytes are called phagocytes. When bacteria enter the body it appears that there is an influence called chemotaxis, existing between the bacteria and the white blood corpuscles which either causes them to attract or repel each other. It is said to be positive when there is a mutual attraction and negative when there is a mutual repulsion. If positive, the two come together,—a battle ensues and if the phagocytes are able to destroy the bacteria the disease is limited, if not, the disease progresses. If there is a negative chemataxic the bacteria are permitted to undergo development with but little interference, which generally means a fatal termination for the individual. It has been found that the white blood corpuscles have but little influence on the bacteria unless the latter are first acted upon by a certain substance called opsonin found in the blood serum.

6. *Ehrlich's lateral chain theory of immunity.* It is probable that there is no problem in the entire field of medicine that has required such profound reasoning as that which was necessary for the development of this theory. This theory teaches that the various cells of the body have a chemical nucleus to which is attached a number of groups of atoms called receptors or side chains. These are ordinarily concerned with the nutrition of the body, but they are also capable of uniting with the toxins or poisons of various bacteria. According to the theory, differ-

ent side chains are necessary for combining with the different poisons of different bacteria, and if there exists no side chain capable of uniting with any of the poisons, such an animal is said to be naturally immune. Thus, if the human being is inoculated with the germ which produces chicken cholera the germ will grow for a while but in the absence of proper receptors, the toxin of this germ cannot unite with the cells of the body and therefore cannot produce any disease condition; on the other hand if the human being is inoculated with the diphtheria bacillus the poison of this germ will unite with the proper receptors permitting the poison to act and destroy the receptors with which they are united. It is a fundamental principle of human economy that when a certain part of the body is destroyed the remainder of the body has a tendency to reproduce that part, and not only to reproduce as much as was destroyed but tends to form even a little more than existed previously; so also with this theory of immunity, when one side chain is destroyed not only do the cells of the body reproduce a side chain to take its place but reproduce a number of side chains,—indeed so many as the result of repeated stimulation that the side chains cannot all remain attached to the nucleus and are thrown off to float free in the circulation. If now the toxin of the diphtheria bacillus enters the circulation, it first comes in contact with these accessory or free side chains, unites with them and is neutralized by them, thus not giving the toxin an opportunity to affect the cells of the body. This then represents acquired immunity which may be produced actively in the body as a result of the infection or passively by the injection of the side chains (antitoxic serum) into the body which is done to prevent infection. It is indeed a beautiful theory, and when considered in detail it explains the phenomena of immunity better than any other theory.

The subject of immunity applies not only to infective diseases but very properly refers also to the resistance to any poisons. Thus it is possible to develop immunity against snake venom or against the use of certain poisonous products. It is well known, for instance, that if an individual has taken drugs such as morphine, alcohol, cocaine, etc., for some time he will eventually be able to take large doses of these drugs with apparently very little immediate deleterious results. It must not, however, be understood that simply because the deleterious effects are not sudden and marked that such are not produced. Any drug habit causes a marked deterioration of the mental capacity.

Local immunity refers to immunity of local tissues or parts of the body to infection. Thus the muscles of the body are much more immune than the more specialized organs, such as the liver, kidneys, etc. All in all the subject of immunity is a comparatively new one. Its development has been rapid and the study of its various phases promises to do much toward the alleviation of human suffering and the eradication of specific infectious diseases.

IMMURE, v. *ĭm-mūr'* [OF. *emurer*, to immure or wall about—from *em*, in, within; *murer*, to wait: L. *im*, in or into; *mūrŭs*, a wall: comp. Gael. *mur*, a wall]: to inclose within walls; to shut up; to confine; to imprison. IMMU'RING, imp. placing within walls in restraint, or as a punishment. IMMURED', pp. *-mūrd'*. IMMURES, n. plu. *ĭm-mūrz'*, in *OE.*, walls; inclosures.

IMMUTABLE, a. *ĭm-mū'tă-bl* [F. *immutable*—from L. *immūtābĭlĭs*, unchangeable—from L. *im*, not, and *muto*, I change: It. *immutabile*]: unchangeable; unalterable; not capable of change. IMMU'TABLY, ad. *-blĭ*. IMMU'TABIL'ITY, a. *-bĭl'ĭ-tĭ* [F. *immutabilité*]: and IMMU'TABLENESS, n. *-bl-nĕs*, unchangeableness; that quality that renders change impossible.

IMOLA, *ē'mō-lâ* (anc. *Forum Cornelii*, or *Forum Syllæ*): town of Italy, province of Bologna, in a fruitful plain adjoining picturesque hills, close to the river Santerno, 24 m. w.s.w. of Ravenna. It contains some fine palaces, churches, theatres, and benevolent institutions. Imola has some good manufactures of wax, oil, majolica, silk, and glass, besides extensive leather-curing establishments, and brick and tile-works. From a species of white grape grown in the vicinity, the delicious wine known as *vin santo* is manufactured. Pop. 9,275.

IMP, n. *ĭmp* [mid. L. *impŏtus*, a graft: Sw. *ymp*, a shoot or scion: AS. *impan;* O.H.G. *impiton;* Ger. *impfen*, to graft]: in *OE.*, a scion or son, originally always in a good sense, as in Henry VIII.'s reign, Prince Edward is called 'that goodly *imp'*; a shoot; a child; usually in a bad sense, as 'an imp of hell'; a little devil: V. in *OE.*, to graft; to lengthen or extend. IMP'ING, imp. IMPED, pp. *impt*. IMPISH, a. *ĭmp'ĭsh*, somewhat like an imp. IMP OF DARKNESS, son of darkness; the devil.

IMPACT, n. *ĭm'păkt* [L. *impac'tus*, driven furiously into—from *im*, into; *pango*, I drive in]: in *mech.*, the shock of two bodies coming together; touch; impression: V. *ĭm-păkt'*, to drive close or hard; to press or drive firmly together. IMPACT'ING, imp. IMPACT'ED, pp. IMPACTION, n. *ĭm-păk'shŭn*, a disease in cattle, sheep, horses, fowls, etc., in which the food becomes closely impacted in the stomach—becoming hard and dry, the food is incapable of digestion, and the animal shortly dies; the stomach-staggers.

IMPAGES, n. plu. *ĭm-pā'jēz* [L. *impāgēs*]: in *arch.*, the horizontal parts of the framework of a door.

IMPAIR, v. *ĭm-pär'* [F. *empirer;* OF. *empeirer*, to impair, to make worse—from L. *im*, intensive; *pejor*, worse]: to make worse; to diminish in value, excellence, or quality. IMPAIR'ING, imp. IMPAIRED', pp. *-pärd'*: ADJ. made worse; injured. IMPAIR'ER, n. *-ĕr*, one who.—SYN. of 'impair': to weaken; enfeeble; diminish; decrease; injure.

IMPALE [see EMPALE], in Heraldry: to arrange two coats of arms side by side in one shield divided per pale. It is usual thus to exhibit the conjoined coats of husband and wife, the husband's arms occupying the dexter side or place of honor, and the wife's the sinister side of the escutcheon. When a man marries a second wife, heralds say that he may divide the sinister half of the shield per fess into two compartments, placing the family arms of his deceased wife in chief, and of his second wife in base. A husband impaling his wife's coat with his own, is not allowed to surround the former with the collar or insignia of any order of knighthood to which he may belong. Bishops, deans, heads of colleges, and kings-of-arms, impale their arms with their insignia of office, giving the dexter side to the former. In early heraldry, when two coats were represented in one shield side by side, only half of each was exhibited, an arrangement which has been called *dimidiation*. Sometimes the one coat only was dimidiated. A reminiscence of dimidiation is preserved in the practice of omitting bordures, orles, and tressures in impaled arms on the side bounded by the line of impalement.

IMPALE, IMPALEMENT. See EMPALE.

IMPALPABLE, a. *ĭm-păl'pă-bl* [F. *impalpable*—from L. *impalpābĭlĭs*—from *im*, not; *palpo*, I touch softly]: not perceptible by the touch; extremely fine, as powder or dust in which no gritty particles can be felt by the touch. IMPAL'PABLY, ad. *-blĭ*. IMPAL'PABIL'ITY, n. *-bĭl'ĭ-tĭ*, the quality of not being perceptible by the touch.

IMPANATION, n. *ĭm'pă-nā'shŭn* [L. *in*, into; *panis*, bread: F. *impanation*]: technical word employed to express a particular theory of the presence of Christ in the elements of bread and wine in the Lord's Supper. The theory was first propounded by Rupert, abbot of Deutz (d. 1135), who likened the mystery of the eucharist to that of the incarnation of the Logos, wherein the divine nature was conjoined with the human nature in the one person of Christ. The term, however, was first used by his contemporary, Alger of Liége, who wrote against him. It was employed as antithetic to Transubstantiation (q.v.), and to express the conception of a permeation of the substance of the bread by the substance of the body of Christ, and therefore their union, while the bread remains unchanged. The term appears again in the controversies of the Prot. reformation in the 16th c., and was erroneously applied by the sacramentarians to the views of Luther and his followers. The Lutheran Church repudiates it as a designation of its doctrine of the Lord's Supper.

IMPANEL, v. *ĭm-păn'ĕl* [*im*, in or on, and *pannel*, a schedule or piece of parchment (see PANEL)]: to enrol the names of a jury in a court of justice in a schedule or piece of parchment; spelled also IMPANNEL. IM-

PANELLING, or IMPAN'ELING, imp. IMPANELLED, or IMPAN'ELED, pp. *-nĕld.*

IMPARADISE, v. *ĭm-păr'ă-dīs* [*im,* and *paradise:* It. *imparadisare,* to imparadise]: to make happy, as if in paradise; to put into a place or state resembling paradise. IMPAR'ADISING, imp. IMPAR'ADISED, pp. *-dīst.*

IMPARIDIGITATE, a. *ĭm-păr-ĭ-dĭj'ĭ-tāt* [L. *impar,* unequal: Eng. *digitate*]: in *comp. anat.,* having an odd number of toes as one, three, or five; as in the horse or the rhinoceros.

IMPARIPINNATE, a. *ĭm'păr-ĭ-pĭn'nāt* [L. *impar,* unequal; *pinnātus,* winged]: in *bot.,* unequally pinnate; pinnate, but ending in an odd leaflet.

IMPARISYLLABIC, a. *ĭm-păr'ĭ-sĭl-lăb'ĭk* [L. *impar,* unequal; *syllăbă,* a syllable]: in *gram.,* not having the same number of syllables—applied to nouns increasing their syllables in the oblique cases, as *mens,* the mind—gen. *mentis,* of the mind.

IMPARITY, n. *ĭm-păr'ĭ-tĭ* [L. *impar,* unequal: F. *impair,* unequal, odd]: not divisible into equal parts; inequality; difference in degree of rank or excellence.

IMPARK, v. *ĭm-pârk'* [*im,* in or on, and *park*]: to inclose, as land for a park. IMPARK'ING, imp. IMPARKED', pp. *-pârkt'.*

IMPARLANCE: a term denoting the continuance of a cause for a few days to give one of the parties to the issue time to answer the pleadings of his opponent.

IMPART, v. *ĭm-pârt'* [OF. *impartir*—from L. *impartīrĕ,* to share with another—from *im,* into; *pars,* or *partem,* a part: Sp. *impartir,* to impart]: to bestow or give; to communicate; to convey; to make known. IMPART'ING, imp. IMPART'ED, pp. IMPART'ER, n. one who. IMPART'IBLE, a. *-ĭ-bl,* that may be imparted or communicated. IMPART'IBIL'ITY, n. *-bĭl'ĭ-tĭ,* quality of being impartible. —SYN. of 'impart': to confer; grant; give; discover; divulge; share; yield; reveal; disclose; bestow; show.

IMPARTIAL, a. *ĭm-pâr'shăl* [*im,* not, and *partial:* F. *impartial*]: not disposed to favor one more than another; unbiased; just. IMPAR'TIALLY, ad. *-lĭ.* IMPAR'TIAL'ITY, n. *-shĭ-ăl'ĭ-tĭ* [F. *impartialité*]: freedom from bias or prejudice in opinion or judgment.

IMPARTMENT, n. *ĭm-pârt'mĕnt* [see IMPART]: in *OE.,* disclosure of some knowledge or information; a communication.

IMPASSABLE, a. *ĭm-păs'să-bl* [*im,* not, and *passable*]: that cannot be passed; not admitting a passage. IMPAS'SABLY, ad. *-blĭ.* IMPAS'SABLENESS, n. *-bl-nĕs,* the state of being impassable.—SYN. of 'impassable': impervious; impenetrable; pathless.

IMPASSIBLE, a. *ĭm-păs'sĭ-bl* [F. *impassible,* calm, tranquil: It. *impassibile,* that cannot suffer—from L. *impassĭb'ĭlĭs*—from *im,* not; *passus,* suffered]: incapable

of pain, passion, or suffering; that cannot be affected or disturbed by external causes. IM'PASSIBIL'ITY, n. *-bĭl'ĭ-tĭ* [F. *impassibilité*]: also IMPAS'SIBLENESS, n. *-bl-nĕs*, exemption from pain or suffering; insusceptibility of being affected or injured by external things. IMPAS'SIVE, a. *-păs'sĭv* [L. *im*, not; *passus*, suffered]: not susceptible of pain or suffering; free from emotion of any kind. IMPAS'SIVELY, ad. *-lĭ*. IMPAS'SIVENESS, n. the state of being insensible of pain.

IMPASSION, v. *ĭm-păsh'ŭn* [*im*, into, and *passion*]: to move or affect strongly with passion. IMPAS'SIONING, imp. IMPAS'SIONED, pp. *-ŭnd:* ADJ. marked by passion or feeling, as a speech; excited; glowing; having the feelings excited, as a speaker. IMPAS'SIONABLE, a. *-ă-bl*, excitable. IMPAS'SIONABLY, ad. *-blĭ*.

IMPASTE, v. *ĭm-pāst'* [*im*, in or on, and *paste*]: to form into or cover, as with paste; to lay on colors. IMPAST'ING, imp. IMPAST'ED, pp. IM'PASTA'TION, n. *-păs-tā'shŭn*, the union of different substances by means of cements. IMPASTO, n. *ĭm-păs'tō* [It.]: a style of art in which pigments are applied to an appreciable thickness forming figures in low relief; generally, a term expressing the thickness of the layer of pigment applied by the painter to his canvas.

IMPATIENT, a. *ĭm-pā'shĕnt* [F. *impatient*—from L. *impatĭen'tem*, that cannot bear—from *im*, not; *patĭĕns*, suffering]: uneasy or fretful under suffering or delay; not enduring; hasty. IMPA'TIENCE, n. *-shĕns* [F.—L.]: restlessness; uneasiness under pain or suffering; restless discontentment under any condition, with eagerness to change it. IMPA'TIENTLY, ad. *-lĭ*.—SYN. of 'impatient': hot; eager; uneasy; fretful; intolerant.

IMPAWN, v. *ĭm-pawn'* [*im*, into, and *pawn*]: to pledge; to deposit as a security. IMPAWN'ING, imp. IMPAWNED', pp. *-pawnd'*.

IMPEACH, v. *ĭm-pēch'* [F. *empêcher*, to hinder: OF. *empacher*, to encumber, to hinder, from the notion of entangling with a sticky material—from mid. L. *impactārĕ*, to bind, to fasten]: to charge with a crime or misdemeanor; to charge with treason or high public crimes, as a minister of state; to call in question. IMPEACH and IMPEACHMENT, in *OE.*, hindrance. IMPEACH'ING, imp. IMPEACHED', pp. *-pēcht'*. IMPEACH'ER, n. *-ĕr*, one who. IMPEACH'ABLE, a. *-ă-bl*, liable to accusation. IMPEACH'MENT, n. *-mĕnt*, a charge or accusation; an endeavor to *fasten* a charge of treason on a person; an accusation and prosecution for treason or other high crimes or misdemeanors.—SYN. of 'impeach, v.': to arraign; accuse; criminate; censure; indict; charge; cite; in *OE.*, hinder; impede.

IMPEACH'MENT: accusation and trial of a peer or member of parliament in England, or indeed, any other person, before the high court of parliament, for treason,

or some high crime or misdemeanor. This kind of trial is reserved for great and enormous offenders, particularly in matters affecting the constitution; for the ordinary tribunals generally suffice for all cases of crimes. Impeachment, accordingly, is of rare occurrence, the last instance being that of Lord Melville 1805; but it remains one of the high prerogatives of parliament to try offenders in this way. The proceedings nearly resemble an ordinary trial at law. A pardon by the crown is not pleadable in bar of the prosecution, though, after sentence, the crown may pardon the offender. See BILL OF ATTAINDER.

IMPEACHMENT OF THE PRESIDENT OF THE UNITED STATES, and of other civil officers.—The constitution of the United States provides (Art. 1, Sec. 3), that the senate shall have the sole power to try all impeachments, that senators sitting for that purpose shall be on oath or affirmation, that the chief-justice shall preside over the trial of the pres., and that the concurrence of two-thirds of the members present shall be necessary to convict. Under this organic law the house of representatives impeaches or makes the charges against the pres., the articles of impeachment being practically the same as the counts in an indictment. The impeachment is sent to the senate, a copy is served on the accused, and the house of representatives appoints a committee of its members as 'managers' or prosecutors of the impeachment. When the senate is convened as a court, the managers on the part of the house and the counsel for the accused are summoned to appear before it; and the trial proceeds much the same as trials of other causes of large interest. In the impeachment of other officers of the federal govt. the same course is pursued excepting that the pres. of the senate presides. In state constitutions a variety of procedures is provided, but the general course is similar to that under the U. S. constitution, the lower house impeaching, the upper house trying, the governor occupying relatively the place of the pres., and the chief-justice of the state or of its highest court that of the chief-justice of the United States.

IMPEACHMENT OF WASTE: expression in English law, used in deeds or wills. When an estate is given to a person for life, or for a term of years, *without impeachment of waste,* the tenant is entitled to cut timber, and do many things on the estate which otherwise he would be forbidden to do. Still, he is not allowed to do what he likes, for if he abuse his power and attempt to cut down ornamental timber, for example, or deface the family mansion, the court of chancery will interfere by injunction to prevent this.

IMPEARL, v. *ĭm-pĕrl'* [*im,* in or on, and *pearl*]: to decorate with pearls or the resemblance of them; to form in resemblance of pearls.

IMPECCABLE, a. *ĭm-pĕk'kă-bl* [F. *impeccable*—from L. *impeccābĭlĭs*, faultless, sinless—from *im*, not; *pecco*, I err or sin]: not liable or subject to sin. IMPEC'CABIL'ITY, n. *-bĭl'ĭ-tĭ* [F. *impeccabilité*]: exemption from sin or error. IMPEC'CANCY, n. *-kăn-sĭ*, sinlessness.

IMPECUNIOUS, a. *ĭm'pĕ-kū'nĭ-ŭs* [L. *in*, not; *pecūnĭă*, money]: without money; poor. IM'PECUNIOS'ITY, n. *-ŏs'ĭ-tĭ*, the want of money.

IMPEDANCE: the algebraic sum of all the forces tending to oppose current flow. It is made up of resistance, the counter pressure of inductance and that of condensance, all combined with due consideration of their respective magnitudes and phases. See ELECTRO-DYNAMICS, IN ELECTRICITY, PRINCIPLES OF.

IMPEDE, v. *ĭm-pēd'* [L. *impĕdīrĕ*, to hamper or hinder—from *im*, into; *pĕdēs*, feet]: to hinder; to stop progress. IMPE'DING, imp. IMPE'DED, pp. IMPEDIMENT, n. *ĭm-pĕd'ĭmĕnt*, an obstruction; a hindrance; a defect, as in speech. IMPED'IMEN'TAL, a. *-mĕn'tăl*, hindering. IMPED'ITIVE, a. *-tĭv*, causing hindrance.—SYN. of 'impediment': obstacle; difficulty; clog.

IMPEL, v. *ĭm-pĕl'* [L. *impel'lĕrĕ*, to drive forward—from *im*, into; *pello*, I drive]: to drive or urge forward; to excite to action; to incite. IMPEL'LING, imp.: ADJ. urging; pressing. IMPELLED', pp. *-pĕld'*. IMPEL'LER, n. *-lĕr*, one who. IMPEL'LENT, a. *-lĕnt*, a power or force that drives forward.—SYN. of 'impel': to induce; influence; actuate; move; instigate.

IMPEND, v. *ĭm-pĕnd'* [L. *impendērĕ*, to hang over, to threaten—from *im*, into; *pendĕō*, I hang]: to hang over; to menace or threaten; to be approaching and ready to fall on. IMPEN'DING, imp.: ADJ. imminent; threatening. IMPEN'DED, pp. IMPEN'DENT, a. *-dĕnt*, hanging over; threatening. IMPEN'DENCE, n. *-dĕns*, or IMPEN'DENCY, n. *-dĕn-sĭ*, the state of hanging over.

IMPENETRABLE, a. *ĭm-pĕn'ĕ-tră-bl* [F. *impénétrable*—from L. *impĕnetrābĭlĭs*, that cannot be penetrated—from *im*, not; *pĕnĕtrō*, I penetrate or enter]: that cannot be pierced; not to be affected or moved, as by the sight or the mind; not to be entered. IMPEN'ETRABLY, ad. *-blĭ*. IMPEN'ETRABIL'ITY, n. *-bĭl'ĭ-tĭ* [F. *impénétrabilité*]: one of the essential properties of matter, implying that no two bodies can at the same time occupy the same space. If a nail be driven into a piece of wood, it does not, properly speaking, *penetrate* the substance or matter of the wood, for the fibres are driven aside before the nail can enter. If a vessel be filled with fluid, and a solid body be then placed in it, as much water will run over as is equal in bulk to the solid body, in this way making room for it. The lightest gases are really as impenetrable as the densest solid; though, owing to their compressibility, it is not readily made apparent.—Impenetrability, in figurative use, denotes obtuseness, incapa-

bility of being moved or affected.—SYN. of 'impenetrable': inaccessible; unimpressible; unsearchable; inscrutable.

IMPENITENT, a. *ĭm-pĕn'ĭ-tĕnt* [F. *impénitent*, impenitent—from L. *impœnĭten'tĕm*—from *im*, not; *pœnĭtens*, repenting: It. *impenitente*, impenitent]: not repenting of sin; obdurate; not contrite: N. a hardened sinner. IMPEN'ITENTLY, ad. *-lĭ*. IMPEN'ITENCE, n. *-tĕns* [F.—L.]: or IMPEN'ITENCY, n. *-sĭ*, want of repentance; hardness of heart; want of remorse for crimes.

IMPENNATE, a. *ĭm-pĕn'nāt* [*im*, not, and Eng. *pennate*—from L. *penna*, a feather]: having very short wings, useless for flight; of the tribe IM'PENNA'TES, *-nā'tēz*, swimming birds having short wings covered with rudimentary feathers resembling scales; e.g., the penguin, and the great auk. Such birds are usually placed in the family *Brevipennatæ;* ord. *Natatores*. See PENGUIN; AUK; DIVER; GREBE; GUILLEMOT.

IMPERATIVE, a. *ĭm-pĕr'ă-tĭv* [F. *impératif*, imperative, imperious—from mid. L. *imperatīvŭs*, due to a command: It. *imperativo*, fit for command, imperative—from L. *impĕrō*, I command]: expressing or containing positive command or desire; positive; authoritative; in *gram.*, the simple form of the verb, which expresses command or exhortation, as *go, eat, sing*. IMPER'ATIVELY, ad. *-lĭ*. CATEGORICAL IMPERATIVE, in the *system of Kant* (q.v.), the absolute law of duty, with no possibility of evasion. According to Kant, man, in the consciousness of his moral liberty, recognizes two great laws regulating his will; the first prompts him to seek his own well-being, the second *commands* him to be virtuous, even at the sacrifice of that. From this opposition in his moral nature between desire and conscience, springs the idea of duty, which, in the Kantian terminology, is called the 'moral imperative,' to which Kant adds the epithet *categorical*, to indicate that its commands are absolute and unconditional.

IMPERATIVE IDEA. See FIXED IDEA.

IMPERCEPTIBLE, a. *ĭm'pĕr-sĕp'tĭ-bl* [F. *imperceptible*—from *im*, not, and *perceptible*]: not to be known or discovered by the senses; very small or fine; very slow in motion or growth. IM'PERCEP'TIBLY, ad. *-tĭ-blĭ*. IM'PERCEP'TIBLENESS, n. *-bl-nĕs*.

IMPERFECT, a. *ĭm-pĕr'fĕkt* [OF. *imperfeit*, or *imperfaict*—from L. *imperfec'tus*, incomplete—from *im*, not; *perfectus*, complete]: not completed or finished; defective; liable to err; in *gram.*, applied to the tense of a verb expressing unfinished action, as I *was eating*. IMPER'FECTLY, ad. *-lĭ*. IM'PERFEC'TION, n. *-fĕk'shŭn* [F.—L.]: the state of being defective; a fault or blemish. IMPER'FECTNESS, n. state of being imperfect. IMPERFECTIBLE, a. *ĭm'pĕr-fĕkt'ĭ-bl*, incapable of being made perfect; that cannot be improved. IM'PERFECTIBIL'ITY, n.

-ĭ-bĭl'ĭ-tĭ, the state of being unable to be made perfect. IMPERFECT-OBLIGATIONS, n. in *law,* obligations such as those of charity and gratitude, which cannot be enforced by law.—SYN. of 'imperfection': failing; failure; weakness; frailty; foible; infirmity; fault; defect; deficiency; incompleteness; blemish.

IMPERFORATE, n. *ĭm-pĕr'fō-rāt,* or IMPER'FORATED, a. *-rā-tĕd* [L. *im,* not; *perfŏrātŭs,* bored through]: not perforated or pierced; having no opening or passage of communication; in *bot.,* without a terminal opening. IMPER'FORABLE, a. *-ră-bl,* that cannot be pierced. IMPER'FORA'TION, n. *-rā'shŭn* [F.—L.]: state of being not perforated, or without an aperture.

IMPERIAL, a. *ĭm-pē'rĭ-ăl* [F. *impérial*—from L. *impĕrĭālĭs,* of the empire, imperial—from *impĕrō,* I command; *impĕrĭŭm,* command, empire: It. *imperiale*]: pertaining to an empire or emperor; royal; supreme; anything larger than the usual size, or better than the usual quality. IMPE'RIALIZE, v. *-ăl-īz,* to invest with an imperial character and tone. IMPE'RIALI'ZING, imp. IMPE'RIALIZED, pp. *-īzd.* IMPE'RIALLY, ad. *-lĭ.* IMPE'RIALISM, n. *-ĭzm,* system or state of imperial government. IMPE'RIALIST, n. *-ĭst,* one who belongs to or supports an emperor—particularly applied to the Germans under the old empire. IMPE'RIAL'ITY, n. *-ăl'ĭ-tĭ,* or IMPE'RIALTY, n. *-ăl-tĭ,* the right of an emperor over a certain share of the produce of mines, etc.; imperial power. IMPERIAL LIQUID, see CREAM OF TARTAR. IMPERIAL WEIGHTS AND MEASURES, those enacted by parliament as the legal standards for use in trade and commerce, and generally in ordinary dealings throughout the empire, in contradistinction to local and illegal weights and measures. *Note.*—IMPERIALISM, or CÆSARISM, as a party name, denotes the supposed government of a ministry, or the personal government of a minister of a constitutional country, hardly within the limits of the constitution; the supposed exercise of such a power as belongs to a despotic government.

IMPE'RIAL CROWN: properly the crown borne by the German emperor; in form, a circle of gold, adorned with precious stones and *fleurs-de-lis,* bordered and seeded with pearls, and raised in the form of a cap voided at the top like a crescent. From the middle of the cap rises an arched fillet enriched with pearls, and surmounted by a globe, on which is a cross of pearls. The name Imperial Crown is, however, in English heraldry, applied to the crown worn in times past by the kings of England. From the 12th c. onward, the crown of the English sovereigns underwent repeated changes in form and enrichment. That of Edward II. was formed of four large and four small strawberry leaves, rising in curves from the jewelled circlet, and having eight small flowers alternating with the leaves. In Henry IV.'s crown, eight strawberry leaves, and as many *fleurs-de-lis* alternated with 16 small

groups of pearls, three in each. Under Henry V. the enriched circlet was for the first time arched over with jewelled bands of gold, and the apex of the arches surmounted with a mound and cross, while *crosses patées* were substituted for the strawberry leaves, and roses or *fleurs-de-lis* for the clusters of pearls. The arches, at first numerous and elevated to a point, became, in later times, restricted to four, and depressed in the centre. The imperial crown of heraldry, as now understood, is, in fact, the form of crown worn by the English sovereigns from Charles II. to William IV., as represented in the subjoined cut. It has four *crosses patées,* and four *fleurs-de-lis* set alternately on the circlet, while four pearl-studded arches, rising from within the crosses, carry at their intersection the mound and cross. The state crown of Queen Victoria differs considerably from this, having a far more enriched character. It is covered with diamonds and studded with gems, and the arches are wrought into wreaths of rose, thistle, and shamrock formed of brilliants. A charge, crest, or supporter, crowned with a regal crown, is said to be *imperially crowned.*

IMPERIALISM: a term which may signify (1) sway over an extensive area of unbroken territory like that of Russia; (2) the union of several states or kingdoms for offense, defense, and for fiscal and political purposes, as in Germany; (3) the combination of the interests of a mother country and her colonies and dependencies as distinguished from purely national, colonial, or local concerns; (4) a policy of expansion which leads a republic to acquire territory whose people cannot become citizens and to govern it by arbitrary power. The acquisition by the United States of the Philippines and Porto Rico was indignantly denounced in the political platforms of 1900 as imperialism, the democrats opposing expansion on the ground that to hold the Philippines by force was unconstitutional, as was also the imposing upon the people of those islands and of Porto Rico of a government without their consent, and taxation without representation; and the republicans claiming that the responsibility resultant from the defeat of Spain, and the ensuing failure of the Spanish government, must be met, and a stable government established. A national anti-imperialist league was formed in that year and on Aug. 16, the allied leagues held a congress at Indianapolis, Ind., adopted a platform declaring that a great national crisis menaced the republic, denying that either the president or congress could govern any person anywhere outside the constitution, and identifying President McKinley with imperialism, advised direct support of William J. Bryan as the most effective means of crushing imperialism. Anti-imperialist leagues exist in many cities and their members have circulated a vast amount of literature, some of which has been excluded from the mails as treasonable.

On 1901, Dec. 2, the Supreme Court of the United States handed down a decision on the constitutionality of the policy of expansion. The broad principles settled by the decision are succinctly stated to be these: (1) The constitution does not follow the flag till it is planted on new territory by special act of congress. (2) Extension of the sovereignty of U. S. to new territory carries with it all the constitutional guarantees of the enjoyment of liberty, the right to property, and the protection of the U. S. to the people thus affected in securing justice and maintaining public order and promoting peaceful progress. (3) The islands acquired from Spain by the treaty of Paris are 'property of the United States' in the strict sense in which that term is used in the constitution, and, this being the case, congress can dispose of these islands in any way which it may believe to be conducive to the highest interests of the people of the United States and of these islands. A corollary of these propositions finds expression in the statement that the United States is a trinity in point of territory, which may be described under three heads, as follows: (1) the states; (2) incorporated territories; (3) unincorporated territory, or territory belonging to or appurtenant to the United States.

IMPERIL, v. *ĭm-pĕr'ĭl* [*im*, into, and *peril*]: to bring or lead into danger. IMPERILLING, or IMPER'ILING, imp. IMPERILLED, or IMPER'ILED, pp. *-ĭld*.

IMPERIOUS, a. *ĭm-pē'rĭ-ŭs* [L. *impĕrĭōsŭs*, possessed of command, domineering—from *impĕrĭŭm*, a command: F. *impérieux*]: assuming or exercising authority in a manner highly offensive to others; haughty; overbearing; not capable of being resisted; urgent. IMPE'RIOUSLY, ad. *-lĭ*. IMPE'RIOUSNESS, n. *-nĕs*, a dictatorial and bold contempt for the rights or feelings of another; haughtiness. —SYN. of 'imperious': dictatorial; authoritative; imperative; commanding; domineering; lordly; tyrannical; despotic; arrogant; pressing; powerful; ascendant.

IMPERISHABLE, a. *ĭm-pĕr'ĭsh-ă-bl* [F. *impérissable:* L. *im*, not, and Eng. *perishable*]: not subject to decay; indestructible; calculated to last always. IMPER'ISHABLY, ad. *-blĭ*. IMPER'ISHABLENESS, n. *-bl-nĕs*.

IMPE'RIUM: word used in the Roman law in various senses, the most important of which is that which it bears when applied to consuls and proconsuls—thence called imperatores. Most of the superior magistrates were also intrusted with the imperium, which meant a sovereign authority.

IMPERMEABLE, a. *ĭm-pĕr'mē-ă-bl* [F. *imperméable*, impervious—from L. *im*, not; *permĕō*, I penetrate]: not admitting the passage of water or other liquid through; rendered waterproof by the application of a solution. IMPER'MEABLY, ad. *-blĭ*. IMPER'MEABLENESS, n. *-bl-nĕs*,

or IMPER'MEABIL'ITY, n. *-bĭl'ĭ-tĭ,* the state or quality of being impermeable.

IMPERSONAL, a. *ĭm-pėr'sŏn-ăl* [F. *impersonnel,* impersonal—from L. *impersōnālis*—from *im,* not, and *persōnă,* a character, a person]: not personal; not having personality. IMPER'SONAL'ITY, n. *-ăl'ĭ-tĭ,* the want or absence of personality. IMPER'SONALLY, ad. *-ăl-lĭ.* IMPERSONAL VERBS, those verbs which are used only in the 3d pers. sing. of each tense, with the pron. *it* as a nominative, as 'it rains,' 'it snows': perhaps also the form in the first person, 'methinks' = 'it seems to me.'

IMPERSONAL JUDGMENT. See JUDGMENT.

IMPERSONATE, v. *ĭm-pėr'sŏn-āt* [*im,* in or on, and *personate*]: to represent another person by imitating his attributes or habits. IMPER'SONATING, imp. IMPER'SONATED, pp. IMPER'SONA'TION, n. *-ā'shŭn.*

IMPERTINENT, a. *ĭm-pėr'tĭ-nĕnt* [F. *impertinent,* impertinent—from mid. L. *impertĭnen'tem: im,* not, and Eng. *pertinent*]: rude; unmannerly; impudent; meddling unduly with the matters of others: N. one rude or unbecoming in behavior. IMPER'TINENTLY, ad. *-lĭ.* IMPER'TINENCE, n. *-nĕns* [F.—L.]: rudeness; improper interference not becoming age or station; in *law,* irrelevant matter introduced into an affidavit or pleading—usually ordered by the court to be stricken out. IMPER'TINENCY, n. *-nĕn-sĭ,* state of being troublesome and intrusive; sauciness; rudeness; in *OE.,* that which is of no weight or importance; something not belonging to the subject; a trifle; a thing of no value.—SYN. of 'impertinent, a.': trifling; frivolous; insolent; officious; importunate; intrusive; meddling; saucy; in *OE.,* irrelevant; inapplicable; misplaced; trifling; foolish.

IMPERTURBABLE, a. *ĭm'pėr-tėrb'ă-bl* [F. *imperturbable*—from mid. L. *imperturbābĭlĭs:* L. *im,* not; *perturbātŭs,* confused or disturbed utterly]: that cannot be disquieted or disturbed. IM'PERTURB'ABLY, ad. *-blĭ.* IMPER'TURBA'TION, n. *-bā'shŭn,* calmness; freedom from agitation of mind. IM'PERTURB'ABIL'ITY, n. *-bĭl'ĭ-tĭ* [F. *imperturbabilité*]: self-possession; coolness.

IMPERVIOUS, a. *ĭm-pėr'vĭ-ŭs* [L. *impervĭŭs,* that cannot be passed through—from *im,* not; *pervĭŭs,* passable: It. *impervio*]: not penetrable; not to be pierced; affording no way or passage. IMPER'VIOUSLY, ad. *-lĭ.* IMPER'VIOUSNESS, n. *-nĕs,* the state of not admitting a passage. IMPER'VIABLE, a. *-vĭ-ă-bl,* impervious.—SYN. of 'impervious': impassable; pathless; impenetrable.

IMPETIGO, n. *ĭm'pĕ-tī'gō* [L. *impĕtīgo,* a scabby eruption—from *impĕtō,* I attack: F. *impétigo*]: skin disease characterized by clusters of pustules, which may either be scattered or in groups. These pustules burst, dry up, and become covered with scabs or crusts of a yellow color, not unlike little masses of candied honey.

From beneath these crusts, a purulent discharge commonly takes place; the crusts become thicker and larger, and the skin around and beneath them is red and raw. The disease affects children and infants especially. The treatment consists in the removal of the crusts by soaking in olive oil and the subsequent application of an ointment of carbolated oxide of zinc, or of ammoniated mercury.

The disease known as *Crustea lactea,* which sometimes covers the faces of children like a mask, is a sort of compound of impetigo and eczema. A rose-water lotion containing oxide of zinc (15 grains to the ounce) is a useful application; or the treatment above indicated may be employed with benefit. IM'PETIG'INOUS, a. *-tĭj'ĭ-nŭs,* of the nature of or relating to.

IMPETRATE, v. *ĭm'pĕ-trāt* [L. *impetrātus,* accomplished, effected: F. *impétrer*]: to obtain by request or entreaty. IM'PETRATING, imp. IM'PETRATED, pp. IM'PETRA'TION, n. *-shŭn,* entreaty or petition of the nature of a demand; the pre-obtaining a church living from the pope, the disposal of which belonged to the king or other patron.

IMPETUOUS, a. *ĭm-pĕt'ū-ŭs* [F. *impétueux,* impetuous —from mid. L. *impetŭōsŭs*—from L. *impĕtus,* violence, force: It. *impetuoso,* impetuous]: rushing with force and violence; moving or acting with force; hasty; violent. IMPET'UOUSLY, ad. *-lĭ.* IMPET'UOUSNESS, n., or IMPET'UOS'ITY, n. *-ŏs'ĭ-tĭ* [F. *impétuosité*]: a rushing with violence or great force; force with fury; vehemence of temper. IMPETUS, n. *ĭm'pĕ-tŭs,* violent tendency to any point; violent effort; force of quantity of motion; the force with which a body is driven.—SYN. of 'impetuous': forcible; rapid; furious; precipitate; passionate; boisterous; raging; fierce; vehement.

IMPEYAN, or IMPEYAN PHEASANT, *ĭm'pĭ-an fĕz'ănt* (*Lophophorus Impeyanus*): large gallinaceous bird of family *Phasianidæ,* native of high, cold regions of the Himalaya, but remarkable as much as any tropical bird for splendor of plumage, enhanced by the changing metallic tints which it exhibits—green, steel-blue, violet, and golden bronze. The fine plumage belongs to the male alone. The female is clothed in sober brown, mottled with gray and yellow, and is smaller than the male. The Impeyan has been found capable of domestication, and may probably be found capable of naturalization, in Europe and America. It derives its name from Lady Impey, who first attempted to take it alive to Britain, but failed. The Nepaulese name, *Monaul,* signifies *Bird of Gold.*

IMPIETY, n. *ĭm-pī'ĕ-tĭ* [F. *impiété*—from L. *impĭĕtātem,* impiety—from *im,* not; *pĭŭs,* pious, devout]: any act or expression tending to irreverence toward the Supreme Being or contempt of his laws; want of filial

affection or obedience to parents; profaneness; irreligion. IMPIOUS, a. *ĭm'pī-ŭs* [L. *impĭŭs:* F. *impie*]: irreverent toward God; irreligious; profane. IM'PIOUSLY, ad. *-lĭ.* IM'PIOUSNESS, n.—SYN. of 'impiety': ungodliness; unrighteousness; sinfulness; wickedness; irreverence.

IMPINGE, v. *ĭm-pĭnj'* [L. *impin'gĕrĕ,* to drive into, as one thing into another—from *im,* into; *pan'gĕrĕ,* to strike: It. *impingere*]: to strike or dash against; to clash upon. IMPING'ING, imp. IMPINGED', pp. *-pĭnjd'.* IMPING'ENT, a. *-ĕnt,* falling or striking against; touching upon.

IMPLACABLE, a. *ĭm-plā'kă-bl* [F. *implacable*—from L. *implācābĭlĭs,* unappeasable—from *im,* not; *plācābĭlĭs,* placable]: not to be appeased; stubborn or constant in enmity; in *OE.,* not to be relieved or assuaged. IMPLA'CABLY, ad. *-blĭ.* IMPLA'CABIL'ITY, n. *-bĭl'ĭ-tĭ* [F. *implacabilité*]: also IMPLA'CABLENESS, n. *-bl-nĕs,* irreconcilable enmity; unappeasable malice.—SYN. of 'implacable': inexorable; unrelenting; relentless; unappeasable; irreconcilable; malicious.

IMPLACENTATA, n. *ĭm-plă-sĕn-tā'ta,* or IMPLACENTA'TIA, *-shĭ-ā* [prefix *im-;* L. *placenta,* a cake]: in *zool.,* name given by Owen to the subdivision of Mammals not having the placenta developed. It contains the orders *Marsupialia* and *Monotremata.*

IMPLANT, v. *ĭm-plănt'* [F. *implanter,* to implant: L. *im,* into, and Eng. *plant*]: to infuse; to instil; to fix or plant in the mind for the purpose of growth. IMPLANT'ING, imp. IMPLANT'ED, pp. IM'PLANTA'TION, n. *-tā'shŭn* [F.—L.]: the act of implanting or fixing in the mind.—SYN. of 'implant': to insert; infix; place; ingraft; settle; set; sow; inculcate.

IMPLEAD, v. *ĭm-plēd'* [*im,* in or on, and *plead:* F. *plaider,* to plead]: to state the case for the plaintiff; to prosecute or sue at law. IMPLEAD'ING, imp. IMPLEAD'ED, pp. IMPLEAD'ER, n. one who.

IMPLEMENT, v. *ĭm'plĕ-mĕnt'* [mid. L. *implēmen'tum,* that which fills up or completes—from L. *implērĕ,* to fill full—from *im,* in; *plērĕ,* to fill]: in *Scot. law,* to fulfil or perform an engagement, or a decree of the court. IMPLEMENT'AL, a. *-al,* pertaining to or in any way connected with implements; characterized by the use of implements. IM'PLEMENT'ING, im. IM'PLEMENT'ED, pp. IMPLETION, n. *ĭm-plē'shŭn,* the act of filling.

IMPLEMENT, n. *ĭm'plĕ-mĕnt* [F. *employer,* to employ—from mid. L. *im,* into; *plĭcārĕ:* F. *plier,* to fold]: whatever may be used to supply a want; a tool or instrument of labor. AGRICULTURAL IMPLEMENTS, comprehensive term for implements used in the actual cultivation of the soil, and for those requisite for other operations of farming, and for the preparation of the produce of the land for use, so far as preparation is ordinarily carried on by the farmer. The first implements for the cultivation of

the ground were doubtless such as could be used by man's unaided strength, and many such are still in use, e.g., the spade, the hoe, the fork, and the shovel. When animals were reduced to the service of man, the plow appeared in its first rude form. Grubbers, cultivators, etc., are recent inventions, rollers are more ancient. Sowing machines or drills are modern, but the harrow is ancient, though branches of trees drawn along the newly sown land, long served the purpose of its now carefully adjusted tines.—The necessity of irrigation in some countries early led to implements for accomplishing it. For the Egyptian *shadoof*, see AGRICULTURE. Implements for clearing the ground of weeds, for occasional stirring of the ground while under crop, and for *earthing up* crops, all are, except the hoe, of comparatively recent invention. The scythe and sickle have been used from remote antiquity, though the reaping-machine is a novelty only beginning to assume a very important place. Wheel-vehicles, carts, wagons, etc., of various descriptions and for various purposes are among agricultural implements; also implements for threshing and winnowing corn, for scutching and breaking flax, for ginning cotton, for crushing sugar-cane and evaporating its juice, etc. Various implements are required in the care of cattle, and for the Dairy (q.v.). See separate titles of implements; also of cultivated plants.

IMPLEX, a. *ĭm'plĕks* [L. *implexus*, plaited—from *im*, into; *plecto*, I plait]: infolded; intricate.

IMPLICATE, v. *ĭm'plĭ-kāt* [L. *implĭcātus*, entwined, involved—from *im*, into; *plĭco*, I fold]: *literally*, to entwine into; to bring into connection with, as a crime or fault; to involve. IM'PLICATING, imp. IM'PLICATED, pp. IM'PLICA'TION, n. *-kā'shŭn* [F.—L.]: that which is implied but not expressed; something which may fairly be understood, though not expressed in words. IM'PLICATIVE, a. *-kā'tĭv*, having or conveying implication. IM'PLICA'TIVELY, ad. *-lĭ*.

IMPLICIT, a. *ĭm-plĭs'ĭt* [F. *implicit*, implicit, from inference —from L. *implĭc'ĭtŭs*, entwined or interwoven (see IMPLICATE)]: understood, though not expressed in words; trusting to another; relying entirely. IMPLIC'ITLY, ad. *-lĭ*, by inference. IMPLIC'ITNESS, n. the state of trusting without reserve.

IMPLICIT FUNCTION: see EXPLICIT FUNCTION, under EXPLICIT.

IMPLORE, v. *ĭm-plōr'* [F. *implorer*—from L. *implōrārĕ*, to invoke with tears—from *im*, into; *plora*, I weep over: It. *implorare*]: *literally*, to invoke with tears; to beg or entreat earnestly; to ask with urgency; to beseech: N. in *OE.*, the act of humble and importunate begging or entreaty. IMPLOR'ING, imp. IMPLORED', pp. *-plōrd'*. IMPLOR'ER, n. *-ĕr*, one who. IM'PLORA'TION, n. *-plō-rā'shŭn*, supplication. IMPLORINGLY, ad. *-lĭ*, in the

manner of entreaty.—SYN. of 'implore': to supplicate; crave; entreat; beg; solicit; ask; request; adjure.

IMPLUVIUM, n. *ĭm-plô'vĭ-ŭm* [L. *implūvĭŭm,* that which it rains into—from *im,* into; *plūĭt,* it rains]: tank or basin in the centre of the fore-court or Atrium (q.v.) of an ancient Roman house. In the examples which remain at Pompeii, the impluvium is generally of marble, and is immediately under the unroofed part of the Atrium, intended to receive the rain which runs down from the roof through the opening. The impluvium was frequently adorned with fountains, and formed a peculiar and interesting feature in the dwellings of the Romans.

IMPLY, v. *ĭm-plī'* [OF. *implier* and *impliquer*—from L. *implĭcārĕ,* to entwine or involve—from *im,* into; *plĭcō,* I fold—*lit.,* to entwine into]: to involve or comprise in substance or by fair inference, though not expressed in words; to mean; to signify; in *OE.,* to cover; to entangle. IMPLY'ING, imp. IMPLIED', pp. *-plīd'.* ADJ. virtually contained in, though not expressed.—SYN. of 'imply': to involve; comprise; include, import; denote; wrap up; in *OE.* refer; ascribe; attribute.

IMPOISON, v. *ĭm-poy'zn* [*im,* into, and *poison:* F. *empoisonner,* to poison]: to affect with poison; to imbitter. IMPOI'SONING, imp. IMPOI'SONED, pp. *-znd.*

IMPOLICY, n. *ĭm-pŏl'ĭ-sĭ* [*im,* not, and *policy*]: want of policy or wisdom; unsuitableness to the end proposed; imprudence. IMPOLITIC, a. *-ĭ-tĭk* [F. *impolitique,* impolitic]: not wise or prudent; not suited to promote the end in view. IMPOL'ITICLY, ad. *-lĭ.*—SYN. of 'impolitic': indiscreet; incautious; imprudent; inexpedient; unwise.

IMPOLITE, a. *ĭm-pō-līt'* [L. *impŏlītŭs;* rude, inelegant; *im,* not, and *polite*]: uncivil; rude in manners. IM'POLITE'LY, ad. *-lĭ.* IM'POLITE'NESS, n. want of manners; rudeness.

IMPONDERABLE, a. *ĭm-pŏn'dĕr-ă-bl* [F. *impondérable;* It. *imponderabile,* that cannot be weighed—from L. *im,* not or without; *pondĕrō,* I weigh]: that cannot be weighed; not having sensible weight. IMPON'DERABIL'ITY, n. *-bĭl'ĭ-tĭ,* the want of sensible weight. IMPON'DERABLES, n. plu. *-ă-blz,* or IMPONDERABLE SUBSTANCES, name given to light, heat, electricity, and magnetism, when they were supposed to be forms of matter but of inappreciable weight. See HEAT.

IMPOOF, or IMPOOFOO. See ELAND.

IMPOON, *ĭm-pôn'* (*Antilope* or *Cephalopus mergens*): species of antelope, very plentiful in s. Africa, in wooded districts. It is about 21 inches high at the shoulder, of brownish-yellow color, with white belly. The horns are short and conical, set far back, and inclined backward. It lives solitary or in pairs. From its habit of plunging among bushes when pursued, standing on its hind legs at intervals to observe its pursuers, and disappearing again,

the impoon is called *Duyker-bok* (Diver-buck) by the Dutch colonists of s. Africa, among whom its flesh is in great esteem.

IMPOROUS, a. *ĭm-pōr'ŭs* [*im.* not, and *porous*]: free from pores; not spongy; close of texture; very solid. IM'POROS'ITY, n. *-ŏs'-ĭ-tĭ*, the absence of pores; compactness.

IMPORT, v. *ĭm-pōrt'* [F. *importer*, to import—from L. *importārĕ*, to bring or carry into—from *im*, into; *porto*, I carry]: to bring or carry into; to bring in from another state or country; to bear or convey by words; to mean; to signify; to be of weight or consequence; in *OE.*, to suggest. IMPORTS', v. in *OE.*, it behooves; it interests or concerns any one. IMPORT'ING, imp. bringing into, as goods; bearing, as a meaning. IMPORT'ED, pp. ADJ. brought into a country, applied generally to all goods and merchandise brought by sea. IMPORT, n. *ĭm'-pōrt*, that which is brought into a country; that which is conveyed by words; meaning; tendency; bearing; in *OE.*, importance. IMPORT'ER, n. one who receives goods and produce directly from abroad. IMPORT'ABLE, a. *-ă-bl*, that may be imported. IMPORTA'TION, n. *-tā'shŭn* [F.—L.]: the act or practice of bringing from another state or country; the articles brought from another country; conveyance and delivery. IMPORT'ANT, a. *-pawrt-ănt* [F.—L.]: of great consequence; weighty. IMPORT'ANTLY, ad. *-lĭ*. IMPORT'ANCE, n. *-ăns* [F.—L.]: weight; consequence. IMPORT'ANCY, n. *-ăn-sĭ*, *OE.* for IMPORTANCE. IMPORTS AND EXPORTS, constituting the foreign trade of a country. (See IMPORTS AND EXPORTS, AMERICAN; UNITED STATES COMMERCE; also BALANCE OF TRADE.)—SYN. of 'import v.': to include; denote; imply; concern; interest; introduce; bring in; carry in;—of 'import n.'; merchandise; purport; sense; tenor; drift; signification; scope; intention; weight; consequence;—of 'important': momentous; weighty; forcible; significant; efficacious; in *OE.*, importunate.

IMPORTS AND EXPORTS, AMERICAN: The interchange of commodities among nations, a process now seen in its highest and most elaborate forms of development in the commercial relations between manufacturers, merchants, and financiers of the United States and those of other countries, owes its origin to the brave, enterprising adventurers of Southern Europe, France, Holland, and England, who, during the 14th, 15th, and 16th centuries, scoured the seas in quest of territory for occupation and the exploitation of trifling commercial ventures.

The motives of these men were not primarily patriotic as a rule, but they were, in the hands of Providence, to be the foundation-layers of a gigantic, world-wide commercial, political, and social structure such as now exists and is forever expanding.

IMPORTS AND EXPORTS, AMERICAN.

The discovery and occupation of the Canary Islands, Madeira and the Azores; the doubling of the Cape of Good Hope by Vasco de Gama; the finding of Zanzibar and penetration eastward to the mainland of India; the crossing, thrice, of the Atlantic by Columbus; his landings at Jamaica and Porto Rico; the finding, by Cabot, of Newfoundland, Labrador, Nova Scotia, Virginia, and the present Canadian territory—these events, and such as these, gave an impetus to adventurous navigation that has continued without intermission and still dominates among expert sailors and explorers. Artic and Antartic expeditions are among the most modern illustrations of the Caucasian tendency to seek a further knowledge of the world's resources and hidden treasures.

The establishment, by Portuguese traders, of the first European factory in India, soon after the results of de Gama's expedition became known; the founding of the English East India Company and the explorations of Spain in Mexico and Peru were among the most important events leading, directly or indirectly, to a magnitude of commercial operations such as is now illustrated in the grand aggregates of United States exports and imports.

Portugal, figuring but little in 20th century commerce, at that time led the way in discoveries of subsequently profitable markets on the coast of Africa, in India, and in the Indian archipelago. Spain, now so trifling in stature among nations, in those days pervaded what might be termed the atmosphere of adventure and by her mining work in Central and South America greatly increased the world's available stock of precious metals. French activity in the East and West Indies, in Canada and in the Mississippi region helped to swell the tide of commercial progress. Dutch aggressiveness in New Amsterdam and English colonial development also contributed substantially to the general advance.

When the modern epoch of the import and export trade opened a feeling was engendered against imports as being injurious to a country and in favor of exports as being advantageous; and the prejudice against imports to a certain extent exists at the present time, chiefly on the ground that the employment of labor and capital within a country diminishes as the imports increase, whereas exports are regarded as an encouragement to industrial activity. It has been shown by economists that there is an almost irresistible tendency in exports and imports to balance each other. Prices are lowered in the importing nation when there is an excess of imports, followed by a drain of specie, and thus exportation is encouraged, whereas an excess of exports brings about an inflow of specie with higher prices, and consequently results in importation.

Conspicuous among events connected with the beginnings of New World commerce, which consisted principally of dealings in foodstuffs, metals, dyes, tissues,

and chemical substances, was the importation of negroes, begun by Spain, in the early part of the 16th century. The employment of this class of forced-servitude workers into the West Indies was started by England in 1652. Then followed their introduction by landowners and others in New England and the Southern States.

When the peace of 1783 was declared, the United States comprised a strip of territory on the Atlantic Ocean extending from Maine to Florida, and bounded on the west by the Mississippi river. In 1790 the total area of settlement was 239,935 square miles, having a population of 3,929,214 souls. In this comparatively limited area important commercial products were raised. The tobacco of Virginia and Maryland supplied the world; the rice and indigo of the Carolinas stood high in European markets; and the fish and lumber products of New England, with the breadstuffs of the Middle States, gave a large and profitable commerce with the West Indian Islands, then colonial possessions of Europe. In New York the fur trade centred, and even as early as this time the Northwest Territory pointed to an agricultural possibility which 50 years later was to begin an economic revolution in Europe, the results of which are still incomplete. The extension of national territory west of the Mississippi, and southward so as to include Florida and Texas, has contributed to develop commerce on almost the same lines which were marked out in the first years of the republic.

From the start, agriculture has furnished, and still furnishes, the bulk of United States exports, cotton, hog products, wheat flour, wood, animals, beef products, and wheat figuring as leading items, with an aggregate value of $786,000,000. Manufacturing, as a recognized feature of United States commerce and, consequently, an important division in the consideration of increasing exports and decreasing imports, began in 1816. The inventive genius of Americans, ever since that time, has aided and encouraged capital and enterprise in bringing American manufactured products to the prominence now so universally accorded them. The Federal census returns of 1900, recently issued, report, in their completed form, 641,000 manufacturing establishments in the United States, employing $10,000,000,000 of capital owned by 709,000 proprietors. The number of wage-earners is given as 5,400,000, receiving $2,400,000,000 in wages. The toal cost of materials is reported as nearly $7,400,000,000 and the value of products as over $13,000,000,000.

The American export trade, in spite of many fluctuations in financial, commercial, and political conditions, has shown a steady growth, unmarked by any startling decreases such as might reasonably have been expected as a result of panics, wars, labor troubles, and other disturbances, local, State, National, and international. During the past 27 years the total of merchandise ex-

ports from the United States has remained above $600,000,000. During 1879, 1882, 1884, 1885, 1887, and 1889 the total was between $700,000,000 and $800,000,000; during 1880, 1883, 1890, 1891, 1893–1896, it was between $800,000,000 and $900,000,000; during nine other years the total of exports has exceeded $1,000,000,000.

Exports from United States—Merchandise and Specie.—The grand total of merchandise and specie exports, domestic and foreign, from the United States during the fiscal year 1904 amounted in value to $1,600,000,000. The 10 largest aggregates, in their order of value, were: Cotton (unmanufactured), $371,000,000; iron and steel (manufactures of), $112,000,000; hog products, $105,000,000; mineral oils (refined or manufactured), $72,000,000; wheat flour, $69,000,000; wood (and manufactures of), $65,000,000; copper (manufactures of), $57,000,000; animals, $48,000,000; beef products, $40,000,000, and wheat, $36,000,000. The aggregate for the 10 industries, 1904, as shown above is $975,000,000.

For the fiscal year ending 1905, June 30, the same ten export aggregates as shown above were: Cotton (unmanufactured), $381,000,000; iron and steel (manufactures of), $135,000,000; hog products, $106,000,000; mineral oils (refined or manufactured), $73,000,000; wheat flour, $40,000,000; wood (and manufactures of), $58,000,000; copper (manufactures of), $86,000,000; animals, $47,000,000; beef products, $35,000,000, and wheat, $4,000,000. The total exports in 1905 were valued at $1,518,561,666.

Imports to United States—Merchandise and Specie.—The grand total of merchandise and specie imports into the United States during the fiscal year 1904 amounted in value to $1,125,000,000. The 10 largest aggregates, in their order, were: Sugar, $72,000,000; coffee, $70,000,000; chemicals, $65,000,000; hides and skins, other than fur, $52,000,000; manufactures of cotton, $50,000,000; silk (unmanufactured), $46,000,000; india rubber and gutta percha (crude), $41,000,000; fibres, vegetable (manufactures of), $40,000,000; fibres, vegetable (unmanufactured), $38,000,000, and silk (manufactures of), $32,000,000. The aggregate for the 10 industries, 1904, as shown above, is $506,000,000. Considering only the 10 classes of products outgoing and incoming, the excess of outgoing over incoming products, 1904, was, in round numbers, $469,000,000. A remarkable feature of the aggregate showing for 1904 under the two general headings shown above, including all industries and products, is that almost exactly the same proportion of excess in exports over imports as revealed in 10 products appears.

For the fiscal year ending June 30, 1905, the same ten import aggregates as shown above were: Sugar, $98,000,000; coffee, $85,000,000; chemicals $65,000,000; hides and skins, other than fur, $65,000,000; manufactures of cotton, $49,000,000; silk (unmanufac-

tured), $61,000,000; india rubber and gutta percha (crude), $51,000,000; fibres, vegetable (manufactures of), $40,000,000; fibres, vegetable (unmanufactured), $38,000,000; silks (manufactures of), $33,000,000. During the same period the total imports were valued at $1,117,513,071.

Exports, Merchandise, 1904; *Value by Principal Countries.*—The ten greatest values in merchandise sent from the United States during the fiscal year 1904 went to the following countries: Great Britain and Ireland, $538,000,000; Germany, $213,000,000; British North America, $134,000,000; France, $85,000,000; Netherland, $72,000,000; Mexico, $46,000,000; West Indies, $44,000,000; Belgium, $41,000,000; Italy, $36,000,000, and British Australasia, $27,000,000. The aggregate value of merchandise sent to the ten countries given above is $1,250,000,000.

1905. Great Britain and Ireland, $523,000,000; Germany, $194,000,000; British North America, $143,000,000; France, $76,000,000; Netherlands, $73,000,000; Mexico, $46,000,000; West Indies, $55,000,000; Belgium, $38,000,000, and British Australasia, $26,000,000. The aggregate value of merchandise sent to the ten countries given above during the year ending 1905, June 30, was $1,174,000,000. By grand divisions the exports were as follows: Europe, $1,021,000,000; North America, $261,000,000; South America, $57,000,000; Asia and Oceanica, $162,000,000; Africa, $19,000,000.

Imports, Merchandise, 1904; *Value by Principal Countries.*—The ten greatest values in merchandise received in the United States from other countries, in their order, during the fiscal year 1904 were: From Great Britain and Ireland, $164,000,000; Germany, $109,000,000; France, $81,000,000; Cuba, $77,000,000; Brazil, $76,000,000; East Indies, $58,000,000; British North America, $50,000,000; Japan, $47,000,000; Mexico, $44,000,000 and Italy, $34,000,000. The aggregate value of merchandise sent to the United States from the ten countries given above is $740,000,000.

1905. Great Britain and Ireland, $176,000,000; Germany, $118,000,000; France, $89,000,000; Cuba, $86.000,000; Brazil, $100,000,000; East Indies, $72.000.000; British North America, $63,000,000; Japan, $52,000,000; Mexico, $46,000,000, and Italy, $39,000,000. The aggregate value of merchandise sent to the United States from the ten countries given above during the year ending 1905, June 30, was $841,000,000. By grand divisions the imports were as follows: Europe, $499,000,000; North America, $199,000.000; South America, $120,000,000; Asia, $144,000.000; Oceanica, $20,000.000; Africa, $9.500.000.

Exports from United States, from Principal Ports.—In their order of value, the principal ports of the United States shipped to other countries, during the fiscal year 1904, as follows: New York, $507.000.000;

New Orleans, $149,000,000; Galveston, $145,000,000; Boston and Charlestown, $90,000,000; Baltimore, $83,000,000; Philadelphia, $71,000,000; Savannah, $54,000,000; San Francisco, $33,000,000; Puget Sound, $23,000,000, and Wilmington, N. C., $19,000,000. The increase for the above ports over 1903 were: New York, $1,000,000; Galveston, $40,000,000; Boston and Charlestown, $1,750,000; Baltimore, $1,000,000; Puget Sound, $250,000; Wilmington, N. C., $4,000,000.

Imports Received at Principal Ports of United States.—In their order of value of imports the record shows the following amounts: New York, $600,000,000; Boston and Charlestown, $81,000,000; Philadelphia, $54,000,000; San Francisco, $38,000,000; New Orleans, $34,000,000; Baltimore, $20,000,000; Puget Sound, $11,000,000; Detroit, $4,000,000; Mobile, $4,000,000; Newport News, $2,000,000; Galveston, $1,800,000; Charleston, $1,700,000, and Portland, Me., $1,400,000. The increase in imports received for the above ports over 1903 were: San Francisco, $1,000,000; New Orleans, $5,000,000; Detroit, $165,000; Mobile, $100,000; Galveston, $300,000. The decreases were: New York, $18,400,000; Boston and Charlestown, $6,000,000; Philadelphia, $6,000,000; Baltimore, $7,500,000; Puget Sound, $1,000,000; Newport News, $2,000,000; Charleston, $400,000, and Portland, Me., $1,000,000.

Exports from United States by Classes.—The aggregate under several great headings in 1904 were as follows: Agricultural products, $854,000,000; mining products, $46,000,000; forest products, $69,000,000; fishery products, $9,000,000; domestic manufactures, $452,000,000.

Exports and Imports, Cuba, Porto Rico, Hawaii, and the Philippines.—The following figures for 1905 show the trade of the U. S. with the above named countries: Cuba, exports from U. S. $38,000,000; imports to U. S. $86,000,000; Porto Rico, exports $14,000,000, imports $16,000,000; Hawaii, exports $12,000,000, imports $36,000,000; Philippines, exports $6,000,000, imports, $13,000,000.

Exports from Uninted States, Increase during Decade.—The increase in total value of exports from the United States to Europe 1893–1904, as shown by comparison of totals for 1893 and 1904, was $396,000,000; to North America, $115,000,000; to South America, $18,000,000; to Asia and Oceanica, $66,000,000; Africa and other countries, $18,000,000. The total increase in volume of outward trade of the United States to the geographical divisions shown above is $613,000,000.

Exports and Imports, 1904, Compared by Same Principal Classes of Products.—The value of provisions exported from the United States, 1904, was $175,000,000; imported to the United States, $4,000,000; iron and steel (manufactures of), exported, $112,000,000; imported $27,000,000; oils, exported, $109,000,000; im-

ported, $11,000,000; animals, exported, $48,000,000; imported, $3,000,000; leather (and manufactures of), exported, $34,000,000; imported, $11,000,000; cotton (no manufactures of), exported, $22,000,000; imported, $50,000,000; coal (bituminous), exported, $18,000,000; imported, $5,000,000.

Exports, American Vessels.—The value of exports carried from the United States in American vessels 75 years ago (1830) aggregated $64,000,000. Twenty years later the records show $100,000,000. The official reports for 1904 give a total of $97,000,000.

Exports, Foreign Vessels.— Foreign merchantmen, in 1830, took from United States ports commodities valued at $10,000,000. The amount reached, 1850, exceeded $52,000,000. The aggregate of exportations in foreign bottoms, 1904, showed values totaling $1,211,000,000.

Imports, American Vessels.—American vessels, in 1830, brought to the United States goods worth $66,000,000. This, after two decades, increased to $140,000,000. The latest official reports (1904), indicate $132,000,000 as the value, in that year, of imports arriving in American vessels.

Imports, Foreign Vessels.—The aggregate value of such imports, 1830, was over $4,000,000. In 1850, a grand total of more than $38,000,000 had been reached. The figures for 1904 under this heading show $791,000,000 as the amount represented for that year in imports brought in foreign ships.

Comparison of United States Exports (1902–3) *with Those of Principal Nations.*—The ten countries showing the greatest value of exports (1904–5) from their own territory are: United States, $1,492,000,000; United Kingdom, $1,463,000,000; Germany, $1,243,000,000; France, $864,000,000; Netherlands, $797,000,000; Russia, $516,000,000; British India, $500,000,000; Austria-Hungary, $424,000,000; Belgium, $421,000,000; Italy, $312,000,000.

Comparison of United States Imports (1904–5) *with Those of Principal Nations.*—United Kingdom, $2,682,000,000; Germany, $1,515,000,000; United States, $991,000,000; Netherlands, $1,118,000,000; France, $876,000,000; Belgium, $537,000,000; Austria-Hungary, $416,000,000; Italy, $359,000,000; Russia (1903), $351,000,000; British India, $314,000,000.

Conclusion.—The exports of any country furnish a reliable indication of its productive capacity. The three countries having the greatest productive capacity are, in their order, the United States, the United Kingdom (Great Britain and Ireland) and Germany, with France and the Netherland holding creditable fourth and fifth places.

Imports show, approximately, the ability and necessity of a nation to buy. In the figures it will be noted that Great Britain and Ireland are the largest buyers, Germany being second, and the United States third.

IMPORTUNE, v. *ĭm'pŏr-tūn'* [F. *importuner*, to importune; *importun*, importunate—from L. *importūnŭs*, inconvenient, troublesome]: to press or tease again and again with the same request; to urge with unceasing application. IM'PORTU'NING, imp. IM'PORTUNED', pp. *-tūnd'*. IM'PORTU'NER, n. *-nĕr*, one who. IM'PORTU'NITY, n. *-tū'nĭ-tĭ* [F. *importunité*]: pressing or incessant application for a claim or favor. IMPORTUNATE, a. *ĭm-pŏr'tū-nāt* [mid. L. *importūnātŭs*, pressingly urged]: pressingly urgent; not easily repulsed; incessant in solicitations. IMPOR'TUNATELY, ad. *-lĭ*. IMPOR'TUNATENESS, n. urgent or pressing solicitation.—SYN. of 'importune': to tease; request; press; harass; molest; disturb; annoy; solicit.

IMPOSE, v. *ĭm-pōz'* [F. *imposer*—from *im*, on, upon; *poser*, to place—from mid. L. *pausārĕ*, to place—from L. *pōnĕrĕ*: L. *impŏsĭtŭs*, placed or laid on—from *im*, in or on; *pōnĕrĕ*, to place]: to lay or place on, as a burden or duty; to enjoin: n. in *OE.*, command; injunction. IMPO'SING, imp.: ADJ. commanding; suited to impress forcibly. IMPO'SINGLY, ad. *-lĭ*. IMPOSED', pp. *-pōzd'*. IMPO'SER, n. *-zĕr*, one who impresses or lays on. IMPO'SABLE, *a.* *-zā-bl*, that may be imposed or laid on. IMPOSITION, n. *ĭm'pōzĭsh'ŭn* [F.—L.]: the act of laying on; injunction of anything as a law or duty; imposture; fraud; a tax or toll; oppression; an extra exercise laid on a student as a punishment. IMPO'SING, n. among *printers*, the placing of pages of type upon a stone table, called an *imposing-stone*, and securing them firmly in an iron frame or chase. IMPOST, n. *ĭm'pōst*, a tax or duty laid on goods imported; a burden; the top part of a pillar which supports an arch. TO IMPOSE ON, to deceive; to mislead by a false pretense. IMPOSITION OF HANDS, in *eccles.*, the confirmation or ordination of persons by the bishop laying his hands on them; ordination; confirmation.—SYN. of 'imposition': deception; deceit; trick; charge; burden; injunction; levy; tax; toll; exaction; delusion; cheating; imposture;—of 'impost': tribute; toll; excise; custom duty.

IMPOSSIBLE, a. *ĭm-pŏs'sĭ-bl* [F. *impossible*—from L. *impossĭb'ĭlis*; It. *impossibile*, impossible—from *im*, not, and Eng. *possible*]: that cannot be done; impracticable. IMPOS'SIBIL'ITY, n. *-bĭl'ĭ-tĭ* [F. *impossibilité*]: that which cannot be done; state of being not feasible.

IMPOST. See under IMPOSE.

IM'POST· point where an arch rests on a wall or column. It is usually marked by horizontal moldings, but sometimes these are absent, especially in Gothic architecture, where different forms of impost are used. These have been classed by Prof. Willis as—1st, 'the *continuous* impost,' where the arch moldings are carried down the pier; 2d, 'the *discontinuous* impost,' where the arch moldings abut and are stopped on the pier; 3d, 'the *shafted* impost,' where the arch moldings spring from

a capital, and are different from those of the pier—the form used in the best Gothic; 4th, 'the *banded* impost,' where the pier and arch have the same moldings; but the impost is marked by a band of horizontal moldings, as is frequently the case in Italian-Gothic buildings. These simple forms are sometimes used together, to produce more complex combinations.

IMPOSTHUME, n. *ĭm-pŏs'tūm:* the common but incorrect spelling of APOSTEME, what separates or stands apart; an abscess. See APOSTEME.

IMPOSTURE, n. *ĭm-pŏs'tūr* [F. *imposture;* It. *impostura,* imposture, cheat—from mid. L. *impostūrā*—from L. *impŏsĭtus,* placed or laid on]: deception; fraud. IMPOS'TOR, n. *-tĕr,* one who assumes a character in order to deceive; a cheat.—SYN. of 'impostor': deceiver; rogue; pretender;—of 'imposture': cheat; trick, imposition; delusion.

IMPOTENT, a. *ĭm'pŏ-tĕnt* [F. *impotent*—from L. *impŏten'tem,* powerless—from *im,* not; *pŏtens,* powerful; It. *impotente*]: weak; feeble; wanting strength or power; having no power of sexual intercourse. IM'POTENTLY, ad. *-lĭ.* IM'POTENCE, n. *-tĕns* [F.—L.], also IM'POTENCY, n. *-tĕn-sĭ,* want of strength or power; weakness; imbecility; incapacity of propagation: in law it is a ground for annulling a marriage, if the impotency can be proved to have existed when the contract was entered into.

IMPOUND, v. *ĭm-pŏwnd'* [*im,* into, and *pound*]: to shut up in a pound or pen; to confine; to shut in; to retain in keeping of the court, instead of returning to the owner, a document which has been produced in a case—in order to enable a prosecution to be brought if necessary; to store water in a reservoir. IMPOUND'ING, imp. IMPOUND'ED, pp. IMPOUND'ER, n. one who. IMPOUND'AGE, n. *-āj.* the act of impounding or confining cattle. Impounding is the remedy given to all occupiers of land against the cattle of strangers which stray on such land. It amounts, in fact, to taking and keeping the cattle as security for the damage which they have done. The occupier is then said to distrain the cattle *damage feasant.* This he does by seizing and driving them to the nearest pound—i.e., an inclosed place kept for the purpose—or he may put them in premises of his own. In either case, he is bound to feed and water the cattle at the expense of the owner of such stray cattle, who can recover them only by paying these expenses and the damage done, or on giving security, and bringing an action of Replevin (q.v.) to try the right. The cattle cannot be distrained unless they are at the time actually trespassing upon the land. The details of the law vary in different localities. —In Scotland, a similar right is called the *poinding* of stray cattle.

IMPOVERISH, v. *ĭm-pŏv'ĕr-ĭsh* [corrupted from OF. *appovrissant,* impoverishing, beggaring—from L. *im,* in-

to, or AS. *em* for *en*, to make; L. *pauper;* F. *pauvre;* OF. *povre*, poor]: to reduce to poverty; to make poor; to exhaust, as resources, or the fertility of land. IMPOV'ERISHING, imp. IMPOV'ERISHED, pp. *-ĭsht.* IMPOV'ERISHER, n. *-ėr*, one who. IMPOV'ERISHMENT, n. the act of reducing to poverty; exhaustion.

IMPRACTICABLE, a. *ĭm-prăk'tĭ-kă-bl* [F. *impracticable: im*, not, and *practicable*]: that cannot be done or performed; not to be done by human means; that cannot be easily dealt with; unmanageable; that cannot be used. IMPRAC'TICABLY, ad. *-kă-blĭ.* IMPRAC'TICABIL'ITY, n. *-bĭl'ĭ-tĭ*, or IMPRAC'TICABLENESS, n. *-kă-bl-nĕs*, state or quality of being beyond the power of man, or the means proposed.

IMPRECATE, v. *ĭm'prĕ-kāt* [L. *imprĕcātŭs*, invoked —from *im*, in or on; *prĕcor*, I pray: It. *imprecare*]: to call for evil upon one's self or others; to invoke, as an evil on any one; to pray that a curse or calamity may fall upon. IM'PRECATING, imp. IM'PRECATED, pp. IM'PRECA'TION, n. *-kā'shŭn* [F.—L.]: the act of imprecating; a curse; a prayer that a calamity may fall on some one. IM'PRECA'TORY, a. *-kā'tėr-ĭ*, containing a prayer for evil. —SYN. of 'imprecation': execration; malediction; anathema.

IMPREGN, v. *ĭm-prēn'* [F. *imprégner*, to impregnate: OF. *pregner*, to take (see IMPREGNATE)]: in *OE.*, to impregnate; to make prolific. IMPREGN'ING, imp. IMPREGNED', pp. *-prēnd'.*

IMPREGNABLE, a. *ĭm-prĕg'nă-bl* [F. *imprenable*, impregnable—from L. *im*, not; OF. *pregner;* L. *prehen'dĕrĕ*, to take]: that cannot be reduced or taken by force; not to be moved or shaken. IMPREG'NABLY, ad. *-blĭ.* IMPREG'NABIL'ITY, n. *-bĭl'ĭ tĭ*, state of being impregnable.—SYN. of 'impregnable': unshaken; unmoved; unaffected; invincible.

IMPREGNATE, v. *ĭm-prĕg'nāt* [mid. L. *imprægnātus*, impregnated: It. *impregnare*, to get with young; *impregnatura*, the state of being with young—from L. *im*, in; *prægnans*, with child: F. *imprégner*, to impregnate]: to render or make prolific; to cause to conceive; to saturate; to infuse the qualities or virtues of one thing into another. IMPREG'NATING, imp. IMPREG'NATED, pp. made pregnant or prolific. IM'PREGNA'TION, n. *-nā'shŭn*, act of impregnating; that with which anything is impregnated.

IMPRESA, a. *ĭm-prā'sa* [It.]: in *her.*, a device, a motto, as on a shield, etc.; an impress.

IMPRESARIO, n. *ĭm'prĕs-ā'rĭ-ō* [It.]: one who undertakes any public or private business; the organizer of an opera company.

IMPRESCRIPTIBLE, a. *ĭm'prĕ-skrĭp'tĭ-bl* [L. *im*, not, and *prescriptible*]: that cannot be lost or impaired by neglect or want of use. IM'PRESCRIP'TIBLY, ad. *-blĭ.*

IMPRESS, v. *ĭm-prĕs'* [OF. *impresser,* to impress—from mid. L. *impressārĕ,* to impress: L. *impressus,* formed or made by pressing—from *im,* in or on; *pressus,* pressed or squeezed: It. *impresso,* stamped, impressed]: to make a mark or figure by pressing; to stamp; to indent; to fix deep, as in the mind; to seize or employ for the public service: n. *ĭm'prĕs,* a mark or figure made by pressing; a stamp; the image or figure of anything, as if formed by pressure; effects produced on character, events, etc.; in *OE.,* the act of forcing into any service; compulsion. IMPRES'SING, imp. IMPRESSED, pp. *-prĕst'.* IMPRES'SION, n. *-prĕsh'ŭn* [F.—L.]: the act of impressing; perceptible effects; a mark; a copy; effects produced by external causes on the mind; idea; indistinct recollection; the total number printed at one time, as of a book; a single edition; a print from an engraved plate. IMPRES'SIONABLE, a. *-ă-bl,* liable or subject to impressions; susceptible of impressions. IMPRES'SIBLE, a. *-sĭ-bl,* that readily receives impressions. IMPRES'SIBLY, ad. *-sĭ-blĭ.* IMPRES'SIBIL'ITY, n. *-bĭl'ĭ-ti,* quality of being impressible. IMPRES'SIVE, a. *-sĭv,* adapted to excite solemn attention and feeling. IMPRES'SIVELY, ad. *-lĭ.* IMPRES'SIVENESS, n. *-sĭv-nĕs,* the quality of being impressive. IMPRESS'MENT, n. *-mĕnt,* act of seizing men for the public service; system of enforced service in the navy, formerly much resorted to. IMPRESSURE, n. *ĭm-prĕsh'ūr,* in *OE.,* a mark made by pressure; a dint. IMPRESS-GANG, a party of men formerly employed forcibly to seize men as seamen for ships of war—usually written PRESS-GANG. PROOF IMPRESSION, an early copy taken from an engraved plate, a lithographic stone, and the like.—SYN. of 'impress, v.': to imprint; press; stamp; mark; indent; inculcate;—of 'impression': indentation; print; result; influence; operation; edition.

IMPRESSIONISTS, in Art: class of painters who strive to reproduce on canvas the impression that nature makes on them. Impressionism differs from realism in that it attempts to go deeper; and besides showing a glimpse of nature as it really appears to the eye seeks to convey an idea of the effect that the particular piece of landscape or marine view exerts on the mind. The new school originated in London. It has drawn the severest criticisms of veteran painters; but has gained a degree of popularity, and seems likely to exert at least some modifying force in art.

IMPRESS'MENT: formerly the mode of manning the British navy. The practice had the force of law; for many acts of parliament, from the reign of Philip and Mary to that of George III., had been passed to regulate the system of impressment. Impressment consisted in seizing by force, for service in the royal navy, seamen, river-watermen, and at times landsmen, when state emergencies rendered such procedure necessary. An armed party commanded by officers, usually proceeded to such

houses in the seaport towns as were supposed to be the resort of the seafaring population, laid violent hands on all eligible men, and conveyed them forcibly to the ships of war in the harbor. As it was not in the nature of sailors to yield without a struggle, many terrible fights took place between the press-gangs and their intended victims—combats in which lives were often lost. Nothing can justly be said in favor of impressment; it had not even the merit of an impartial selection from the whole available population.

In recent times, when volunteers fail, a system of Bounties (q.v.) has been resorted to; and it is not probable that recourse will be again had to impressment, though in Britain the laws sanctioning it only slumber, without being repealed. It is not known under the U. S. laws. See ENLIST (ENLISTMENT).

Under the British laws, all eligible men of seafaring habits are liable between the ages of 18 and 55; though some exemptions are made. A press-gang could board a merchant-vessel or a privateer of its own nation in any part of the world, and carry off as many of the best men as could be removed without actually endangering the vessel. The exercise of this power made a privateer dread a friendly man-of-war more than an enemy, and often led to as exciting a chase as when enemies were in pursuit; for the privateer's men were the best sailors, for their purpose, that the naval officers could lay hold on.

IMPREST, n. *ĭm'prĕst* [It. *in presto,* in readiness, in hand]: in *OE.,* money given out for a certain purpose to be afterward accounted for; earnest-money; money advanced. IN PREST, in ready money.

IMPRIMATUR, n. *ĭm'prĭ-mā'tĕr* [L. let it be printed —from *imprĭmō,* I mark or stamp]: the license to print a book, which is printed on the title-page; authority.

IMPRIMIS, ad. *ĭm-prī'mĭs* [L. *imprīmis*—from *im,* in; *prīmŭs,* first]: in the first place.

IMPRINT, n. *ĭm'prĭnt* [*im,* in or on, and *print*]: the place where, the person by whom, and the time when a book is published, printed at the bottom of the title—sometimes at the end, as in newspapers: v. *ĭm-prĭnt',* to mark by pressure; to stamp; to fix on the mind or memory. IMPRINT'ING, imp. IMPRINT'ED, pp.—SYN. of 'imprint, v.': to impress; indent; mark; print; fix.

IMPRISON, v. *ĭm-prĭz'n* [*im,* in or on, and *prison:* F. *emprisonner,* to confine]: to put into or to confine in a prison; to shut up or confine; to restrain. IMPRIS'ONING, imp. IMPRIS'ONED, pp. *-prĭz'nd.* IMPRIS'ONMENT, n. *-n-mĕnt,* the act of putting into prison; confinement in a place; restraint of liberty.—SYN. of 'imprison': to immure; confine; incarcerate;—of 'imprisonment': incarceration; confinement; durance; custody; captivity; bondage.

IMPRIS'ONMENT: actual confinement, forcible restraint, or detention of a person against his will, as a

criminal punishment or civil remedy. The power to imprison is either (1) inherent in courts or magistrates, or (2) conferred upon them by statutes. In civil procedure imprisonment is inflicted usually for debt or actions growing out of money or other property transactions where an intent to deceive or defraud is alleged. Imprisonment for debt is now generally abolished; but in Great Britain and the United States a person refusing to obey an order from competent authority to pay a debt may be imprisoned—not because of the debt—but for contempt of the court or other authority; and an alleged debtor may be imprisoned before judgment has been obtained if it can be shown that he is about to leave the kingdom (Gt. Brit.) or the state (U. S.). In N. Y. the law establishing the national guard provides that any member of the state militia may be imprisoned in default of the payment of his annual dues till they are paid. (See Kent's *Commentaries,* II. 398-9 for a comprehensive summary of the statutes of the various states in the union on imprisonment on mesne or final process in cases of proceedings of creditors against a debtor.) In criminal proceedings imprisonment is resorted to for the detention of persons against whom serious offenses have been alleged till an examination can be had; to secure the appearance of principals, and such witnesses as may be deemed likely to remove from the jurisdiction of the authority having the case before it, at the time of trial; and for the punishment of those convicted of criminal offenses. The length of imprisonment is determined by local state statutes according to the grade of the offense, and differs widely in various states even for identical grades. National convicts, comprising representatives of the army, navy, or other branch of the public service, may be imprisoned in any of the milit. prisons, or in state penitentiaries, the govt. paying the cost of their maintenance in the latter case. Ample opportunity is afforded by the laws of the U. S. federal and state govts. to any one who believes he has been imprisoned wrongfully to secure vindication of his conduct and pecuniary recompense for the loss of his time and the damage to his feelings or his reputation. In such cases the release of the prisoner is effected by means of a writ of *habeas corpus* (q.v.), which insures his personal liberty till the justice of his sentence is more fully determined. The same writ will secure the release of a person lawfully imprisoned who may question the severity of his sentence. Pending final hearing persons released on *habeas corpus* are compelled to give bail for their appearance at the time and place of determination. There is no general law in the United States bearing on imprisonment, either in civil or criminal procedure. See ARREST; BANKRUPTCY; CONTEMPT OF COURT; DEBT, IMPRISONMENT FOR; DEBTOR AND CREDITOR, LAWS OF; INSOLVENCY; WITNESS.

IMPROBABLE, a. *ĭm-prŏb'ă-bl* [F. *improbable*—from

L. *imprŏbābĭlĭs*, not deserving of approbation—from *im*, not; *probo*, I prove]: not likely to be true; unlikely; not to be expected. IMPROB'ABLY, ad. *-blĭ*. IMPROB'ABIL'ITY, n. *-bĭl'ĭ-tĭ*, unlikelihood.

IMPROBA'TION, in Scotch Law: disproving or setting aside a deed on the ground of falsehood or forgery.

IMPROBITY, n. *ĭm-prŏb'ĭ-tĭ* [F. *improbité*—from *imprŏbĭtātĕm: im*, not, and Eng. *probity*]: want of integrity or honesty; baseness.

IMPROFICIENCY, n. *ĭm'prō-fĭsh'ĕn-sĭ* [*im*, not, and *proficiency*]: want of proficiency.

IMPROMPTU, n. *ĭm-prŏmp'tū* [F. *impromptu*, extempore—from L. *in promptu*, in readiness]: a short composition produced on the spur of the moment—usually something witty (see FANTASIA): ADJ. and AD. extempore; off hand.

IMPROPER, a. *ĭm-prŏp'ĕr* [*im*, not, and *proper:* F. *impropre*—from L. *imprŏprĭŭs*, not befitting—from L. *im*, not; *prŏprĭŭs*, one's own, proper]: not suitable; not adapted to a particular end; not becoming; not decent. IMPROP'ERLY, ad. *-lĭ*. IMPROPRIETY, n. *ĭm'prŏ-prī'ĭ-tĭ* [F. *impropriété*]: unsuitableness to character or circumstances; an improper action or speech; an inaccuracy in language. IMPROPER FRACTION, a fraction whose numerator is either equal to or greater than the denominator.

IMPROPRIATE, a. *ĭm-prō'prĭ-āt* [L. *im*, into; *prŏprĭātus*, to appropriate—from *prŏprĭŭs*, peculiar, private]: devolved into the hands of a layman: v. to appropriate to private use; particularly to place ecclesiastical property in the hands of laymen. IMPRO'PRIATING, imp. IMPRO'PRIATED, pp. IMPRO'PRIA'TOR, n. *-tĕr*, a layman who possesses or enjoys church lands. IMPRO'PRIA'TION, n. *-ā'shŭn*, the act of impropriating; the profits of ecclesiastical property in the hands of a layman—so named from being improperly held; the ecclesiastical property appropriated; exclusive possession. The practice of impropriation differs from the somewhat similar but more ancient usage of *appropriation*, inasmuch as the latter supposes the revenues of the appropriated benefice to be transferred to ecclesiastical or quasi-ecclesiastical persons or bodies, e.g. to a certain dignitary in a convent, a college, a hospital; while impropriation implies that the temporalities of the benefice are held by a layman. The practice of impropriation, and still more that of appropriation, as in the case of monasteries, etc., and other religious houses, prevailed extensively in England before the Reformation; and on the suppression of the monasteries, all such rights were, in the reign of Henry VIII., vested in the crown, and were by the crown freely transferred to laymen, to whose heirs have thus descended not only the right to tithes, but also in many cases the entire property of rectories. The spiritual duties of such rectories are discharged by a clergyman, who

is called a vicar, and who receives a certain portion of the emoluments of the living, usually consisting of a part of the glebe-land of the parsonage, together with what are called the 'small tithes' of the parish.

IMPROVE, v. *ĭm-prôv'* [L. *im*, in; OF. *prover;* L. *probārĕ*, to try, to esteem as good]: to make better; to advance in value, etc.; to grow better or wiser; to raise from good to better; to turn to good account. IMPROV'ING, imp.; ADJ. growing better; using to better advantage. IMPROVED', pp. *-prôvd'*. IMPROV'ER, n. one who. IMPROV'ABLE, a. *-ă-bl*, capable of being made better. IMPROV'ABLY, ad. *-blĭ*. IMPROV'ABLENESS, n. *-bl-nĕs*, or IMPROV'ABIL'ITY, n. *-bĭl'ĭ-tĭ*, capableness of being made better. IMPROV'INGLY, ad. *-lĭ*. IMPROVE'MENT, n. *-mĕnt*, advancement nearer to perfection; progress; a making or growing better; practical application, as of a sermon.—SYN. of 'improve': to increase; advance; better; meliorate; ameliorate; heighten; mend; correct; rectify; perfect; augment;—of 'improvement': melioration; advancement; increase; instruction; edification.

IMPROVIDENT, a. *ĭm-prŏv'ĭ-dĕnt* [L. *im*, not; *provĭdens*, or *provĭdentĕm*, foreseeing (see PROVIDENT)]: wanting care to make provision for the future; neglecting measures for future safety or advantage; thoughtless. IMPROV'IDENTLY, ad. *-lĭ*. IMPROV'IDENCE, n. *-dĕns*, want of foresight; want of due regard to consequences. IM'PROVI'DED, a. in *OE.*, unexpected; unforeseen.—SYN. of 'improvident': negligent; careless; heedless; inconsiderate.

IMPROV'ING LEASE: name, in Scotland, for a 'repairing lease,' by which the tenant undertakes to keep the premises in repair.

IMPROVISE, v. *ĭm'prō-vīz'* [F. *improvisé*, done extempore; *improviser*, to speak or compose without preparation—from It. *improvvisare*, to make verses extempore: L. *imprōvīsus*, unexpected]: to compose and recite without premeditation; to do offhand or in a rough and ready way. IMPROVI'SING, imp. IM'PROVISED', pp. *-vīzd'*, extemporized; done in a rough and ready way. IMPROVISATE, a. *ĭm-prŏv'ĭ-sāt*, unpremeditated. IMPROVISATION, n. *ĭm-prō'vī-sā'shŭn*, the art of improvising or speaking extempore. IMPROVISATORE, n. *ĭm'prō-vēz-ă-tō'rā* [It.]: in *Italy*, one who makes and writes short poems on a given theme, without premeditation, and who sometimes sings and accompanies the voice with a musical instrument.—The talent of improvisation is found in races in which the imagination is more than usually lively, as in the Arabs, and in many tribes of negroes. Among the ancients, Greece was the land of improvisation. In modern Europe it has been almost entirely confined to Italy, where Petrarch, 12th c., introduced the practice of singing improvised verses to the lute; and down to the present day, the performances of improvisatori constitute one

of the favorite entertainments of the Italians. Women (*improvisatrices*) have frequently exhibited this talent in high degree. Improvisation is not limited to brief poems of a few verses and of very simple structure, but is often carried on with great art, and in the form and to the length of a tragedy or almost of an epic poem. But when the productions of the most admired improvisatori have been printed, they have never been found to rise above mediocrity. It is worthy of notice that the greater number of the celebrated improvisatori of Italy have been born in Tuscany or the Venetian territories. Siena and Verona have been especially productive of them. Some of the principal are, Serafino d'Aquila (died 1500), Metastasio (q.v.), who soon abandoned the art, Zucco (died 1764), Serio and Rossi (beheaded at Naples 1799), Gianni (pensioned by Bonaparte), and Tommaso Sgricci (died 1836). The best known *improvisatrices* are Magdalena Moralli Fernandez (died 1800), Teresa Bandettini (born 1756), Rosa Taddei (born 1801), Signora Mazzei (probably the first in point of talent), and more lately Giovannina Milli. IM'PROVISATO'RI, n. plu. *-tō'rē*. IM'PROVIS'ATRICE, n. fem. *-vēz'ă-trĭs* or *-trē'chā* [It.]: a woman who makes and recites extempore verses. IM'PROVIS'ATRI'CI, plu. *-vēz-ă-trē'chē*.

IMPRUDENT, a. *ĭm-prō'dĕnt* [F. *imprudent*—from L. *imprūden'tem*, not foreseeing, inconsiderate—from *im*, not; *prūdens*, prudent: It. *imprudente*]: indiscreet; not attentive to the consequences of words or actions; rash. IMPRU'DENCE, n. *-dĕns* [F.—L.]: indiscretion; want of due regard to consequences. IMPRU'DENTLY, ad. *-lĭ*.—SYN. of 'imprudent': heedless; injudicious; incautious; unadvised.

IMPUDENT, a. *ĭm'pū-dĕnt* [F. *impudent*—from L. *impŭden'tem*, without shame—from *im*, not; *pudens*, modest: It. *impudente*]: without modesty; bold; shameless; saucy; insolent. IM'PUDENTLY, ad. *-lĭ*. IM'PUDENCE, n. *-dĕns* [F.—L.]: want of modesty; effrontery; impertinence.—SYN. of 'impudence': shamelessness; audacity; boldness; assurance; insolence; sauciness; rudeness; pertness;—of 'impudent': audacious; brazen; bold-faced; immodest; pert; impertinent; rude; unblushing; forward.

IMPUGN, v. *ĭm-pūn'* [L. *impugnārĕ*, to fight against, to assail—from *im*, in or on; *pugno*, I fight: F. *impugner*, to impugn]: to attack or assail by words; to call in question; to contradict. IMPUGN'ING, imp. IMPUGNED', pp. *-pūnd'*. IMPUGN'ER, n. *-ĕr*, one who. IMPUGN'ABLE, a. *-ă-bl*, that may be impugned or opposed.

IMPULSE, in Psychology: the consciousness of tendency to movement, especially under conditions in which this tendency is either devoid of deliberation or in antagonism to such deliberation. In modern psychology the term is much used in connection with the expression of instinctive traits in both human beings and animals.

Thus the disposition to strike when angry is often keenly felt and is *instinctively impulsive.* Any act which has become habitual, e.g. biting one's nails, may be called forth in an unreflective way and our awareness of the disposition to perform the act illustrates another form of impulse. Strictly speaking every idea is probably naturally impulsive in the sense that were not inhibiting ideas in our minds, movement would instantly follow upon the presence of the idea in consciousness. This condition is sometimes realized in mental disease when the inhibiting ideas do not operate and incoherent action results. (See FIXED IDEA.) An illustration of this abnormal impulsiveness of ideas which appears in people not otherwise mentally peculiar is the desire to jump from high places. The modern view of will renders it substantially equivalent to the *ordering* of our impulses with reference to one another. They thus become systematized and rationalized. See VOLITION.

IMPULSIVE MANIA: instances occur in which, without any preliminary stage of disease or disturbance, an individual, apparently of sound mind, is suddenly seized with an incontrollable impulse to commit some act of violence, perpetrates acts of atrocity or absurdity, altogether inconsistent with his previous disposition and deportment; and then, nearly as quickly, subsides into his ordinary state and habits, retaining no, or a very imperfect recollection of the events which occurred during the paroxysm. Such outbreaks occur sometimes in the epileptic. During the continuance of such an affection, three mental conditions are distinctly traced: (1) The sudden rising and irresistible dominion of an impulse. (2) The abolition or impairment of the apprehension of the real and ordinary relations of the individual. (3) The suspension of the powers by which such propulsions are prevented from rising, or ruled and regulated when they do arise. Alienation of this kind has been recognized chiefly when the instincts are involved; and the most striking illustrations are derived from cases of homicidal or sanguinary tendency, simply because the results may convulse society, or come under the notice of courts of law. But many examples exist of brief periods of aberration which could not be instigated by passion, and involved nothing criminal. It is within the experience of nearly every one to have certain impulses to commit acts of folly or do some senseless thing. Such impulses are, however, easily resisted as a rule. A lady is mentioned who never entered church but she was impelled to shriek, or saw plate-glass but she was impelled to break it; and many persons cannot look from the top of a high building or from a high cliff without feeling an impulse to cast themselves down to the ground or into the abyss. All such are examples of abnormal impulses or, as they are called when strong and irresistible, imperative conceptions. It is when they are uncontrollable and the will

is too weak to resist them that the state merges into insanity.

IMPUNITY, n. *ĭm-pū'nĭ-tĭ* [F. *impunité*—from L. *impūnĭtātem*, freedom or safety from punishment—from *im*, not; *pœna*, punishment: It. *impunità*]: exemption or freedom from punishment, penalty, or injury.

IMPURE, a. *ĭm-pūr'* [F. *impur*—from L. *impūrŭs*, impure, unclean—from *im*, not; *pūrŭs*, pure: It. *impuro*]: not pure; foul; unclean; unchaste; unholy. IMPURE'LY, ad. *-lĭ*. IMPURE'NESS, n., also IMPU'RITY, n. *-pū'rĭtĭ* [F. *impureté*]: foulness; any foul matter; want of purity; want of holiness.—SYN. of 'impure': tinctured; feculent; defiled; unhallowed; lewd; obscene; polluted.

IMPURPLE, v. *ĭm-pĕr'pl* [*im*, into, and *purple*]: to color or tinge with purple. IMPUR'PLING, imp. IMPUR'PLED, pp. *-pld*.

IMPUTA'TION: technical expression in some systems of theology; denoting the transference of guilt or of merit of punishment, or of reward. The doctrine of the imputation of sin is the doctrine which inculcates that all mankind are, as by a formal governmental act of God, made sharers in the fact and consequences of Adam's sin; and the correlative doctrine of the imputation of Christ's righteousness is that which inculcates that the merit or righteousness of Christ is, as by a formal governmental act of God, transferred to those who believe in Him, or, in other words, that they are made sharers in His merit or righteousness. An idea of some transference, or of some intercommunication of good and evil, answers to undoubted realities of human life, both bodily and spiritual; but it has become degraded and materialized. in some of its common representations in theology. The doctrine of the imputation of Adam's sin, e.g., expresses to some minds not only the idea of the participation of the human race in the consequences of Adam's transgression, so that, because he sinned and fell from innocence, they, the inheritors of his corrupt nature, are involved in the miseries of a fallen state, and also proceed to sin; but, moreover, the idea, that the sin of Adam in its direct guilt and wickedness is transferred to his posterity. Thus there is a formal imputation of the sin of Adam to all his descendants: God is supposed to hold all mankind guilty on the ground that Adam disobeyed God. To give a logical justification to this view it is assumed that God entered into a covenant with Adam (see COVENANT), by which the latter was regarded as a representative of the whole human race; so that, when he fell, all mankind sinned in him and fell with him. In the same manner, the merit or righteousness of Christ is supposed to be imputed to believers by a direct and formal transference of the one to the account of the other. In both cases, it is the idea of formal and direct exchange by sovereign power that is prominent; and ac-

cording to some theologians, this idea alone answers to *imputation* of sin or of righteousness. To *impute* sin, is to deal with a *man as a sinner*, not on account of his own act, or at least not primarily on this account, but primarily on account of the act of another; and to *impute* righteousness, is to deal with man as righteous, not primarily because *he is righteous*, nor primarily because he has chosen to take part in the righteousness of Christ, so making that in a moral sense his own; but on account of the righteousness of Christ formally and directly *reckoned as his.*

This is an illustration of the tyranny which technical phrases are apt to exercise in theology. When men coin an imperfect phrase to express a spiritual reality, the reality is likely to be forgotten in the phrase, and men play with the latter as a logical counter, having a force and meaning of its own. Imputation of sin and imputation of righteousness have in this way come to represent legal or pseudo-legal processes in theology, through a working out of the mere legal analogies suggested by the word. But the spiritual reality which lies behind the phrases in both cases is simple enough as it stands revealed in the Scriptures. Imputation of sin is and can be nothing else than the expression of a certain natural unity of Adam and his race. Adam 'being the root of all mankind,' the stock which has grown from this root must share in its degeneracy. The laws of spiritual life and of historical continuity, imply this; it requires no formal or legal process, therefore, to account for the sinfulness of mankind as derived from a sinful source. Men sin, and thus become sinners, because Adam sinned. The fountain having become polluted, the stream is polluted. Men are involved in the conditions which naturally pertain to his guilt by the conditions of human historical existence; but, nevertheless Adam's sin is not their sin, and cannot in the strict sense be imputed to them, for sin is essentially voluntary in every case—an act of self-will; so that every man's sin is his own and not an other's. In the same manner, the highest meaning of the imputation of the righteousness of Christ lies, not in a mechanical or governmental transfer, but in the spiritual unity of the believer with Christ; so that he is in heart one with Christ, and Christ one with him, and in a vital sense he becomes a partaker of the divine nature. The notion of formal legal transference is an after-thought—a mechanical invention of polemical logic; and the fact itself is deeper and truer than the phrase that covers it. The race one with Adam—the race endowed with the privilege of being one with Christ, through a new spiritual birth from on high—all Christ's believing disciples actually one with Christ—these are the great vital facts which the term *imputation* lowers and enfeebles with a technical human wisdom.—The logic of theology has evolved other applications of the phrases; but these ap-

plications are rather the refinements of theological pedantry than the expression of true spiritual relations. The term imputation is now of much less frequent use than formerly.

IMPUTE, *ĭm-pūt'* [F. *imputer*—from L. *impŭtārĕ*, to bring or enter into the account—from *im*, into; *pŭtō*, I reckon: It. *imputare*]: to charge; to attribute; to reckon as belonging to one that which belongs to another. IMPU'TING, imp. IMPU'TED, pp. IMPU'TABLE, a. *-tă-bl* [F.—L.]: ascribable; that may be imputed to. IMPU'TABLY, ad. *-blĭ*. IMPU'TABLENESS, n. *-bl-nĕs*. IMPU'TATIVE, a. *-tă-tĭv*, that may be imputed. IMPU'TATIVELY, ad. *-lĭ*, by imputation. IMPUTATION, n. *ĭm'pū-tā'shŭn* [F.—L.]: charge of evil; censure; reproach; in *theol.*, charging to the account of one what properly belongs to another; in *OE.*, slight notice; hint.—SYN. of 'impute': to ascribe; reckon; regard; consider.

IN, prep. *ĭn* [AS., Ger., Dut., and Dan. *in*, in: Icel. *inni*, within, also a house]: placed before an object, *in* is used to indicate a variety of relations; denoting presence or situation; within; inside of; not outside of; by or through; on account of; out of, as nine *in* ten: AD. within some place; not out; denoting entrance; closely; often used for *into* or *inside*, as he will come *in*, that is, *into* or *inside the house;* used without the object being expressed, as our party is *in*, and our opponents are *out*, that is, *in office*, and *out of office*. INASMUCH, since; seeing that. IN BLANK, signed with the name only, and without other significant writing. IN THAT, because; for the reason that. INS AND OUTS, nooks and corners. IN THE NAME OF, in behalf of; on the part of; a common phrase in invoking, swearing, and praying. PLAY IN AND OUT, to conduct one's self in any matter in a fast and loose way. *Note.*—IN the preposition is used also as an Eng. prefix in composition, as, *inborn, inbred, inlet, instep, inwrap*, etc. We have, however, the Latin cognate form in *inaugurate, incarcerate, incarnate.*

IN, prefix, *ĭn* [L. *in*, in, within—akin to Skr. *an;* Gr. *en;* AS. *in*, in, into]. IN, as a prefix, with its forms IL, IM, IR, signifies *in, into, on*, in verbs and nouns, as *in*clude, to shut *in*, *in*cur, to run *into;* followed by *l*, *in* becomes *il*, as in *il*luminate, to throw light *on;* followed by *b, p*, or *m*, *in* becomes *im*, as in *im*mure, to put *within* walls, *im*bibe, to drink *in*, *im*port, to carry *in;* followed by *r*, *in* becomes *ir*, as in *ir*rigate, to let water flow *on*.

IN, prefix, *ĭn* [L. *in*, not—akin to Skr. and Gr. *an;* Goth. and Ger. *un*, not]. IN, as a prefix, with its forms IG, IL, IM, IR, signifies *not* in adjectives, as *in*correct, *not* correct; followed by *gn*, *n* is suppressed, and *in* becomes *i*, as in *i*gnoble, *not* noble, *i*gnorant, *not* knowing; followed by *l*, *in* becomes *il*, as in *il*licit, not permitted; followed by *p* or *m*, *in* becomes *im*, as in *im*mature, *not* ripe, *im*prudent, *not* prudent; followed by *r*, *in* becomes *ir*, as in *ir*regular, *not* according to rule.

INABILITY, n. *ĭn'ă-bĭl'ĭ-tĭ* [L. *in*, not, and *ability*]: want of power or strength; want of adequate means; incapacity.—SYN.: incompetence; disability; impotence; weakness.

INACCESSIBLE, a. *ĭn'ăk-sĕs'sĭ-bl* [F. *inaccessible:* L. *in*, not, and Eng. *accessible*]: not to be reached; not to be obtained or approached. IN'ACCES'SIBLY, ad. *-blĭ.* IN'ACCES'SIBIL'ITY, n. *-bĭl'ĭ-tĭ*, or IN'ACCES'SIBLENESS, n. *-bl-nĕs*, the quality or state of being accessible.

INACCURATE, a. *ĭn-ăk'kū-rāt* [L. *in*, not, and *accurate*]: not exact or correct; not according to truth. INAC'CURATELY, ad. *-lĭ.* INAC'CURACY, n. *-ră-sĭ*, defect; want of exactness.—SYN. of 'inaccuracy': error; defect; fault; mistake; blunder.

INACTION, n. *ĭn-ăk'shŭn* [F. *inaction:* L. *in*, not, and Eng. *action*]: want of action; cessation of action; forbearance from labor; idleness; rest. INAC'TIVE, a. *-tĭv*, not active; dull; slothful; idle. INAC'TIVELY, ad. *-lĭ.* IN'ACTIV'ITY, n. *-ĭ-tĭ* [F. *inactivité*]: habitual idleness; want of action or exertion.—SYN. of 'inactive': inert; sluggish; lazy; indolent.

INADEQUATE, a. *ĭn-ăd'ĕ-kwāt* [L. *in*, not, and *adequate*]: not equal to the real purpose, state, or condition of a thing; incomplete; defective. INAD'EQUATELY, ad. *-lĭ.* INAD'EQUATENESS, n., or INAD'EQUACY, n. *-kwă-sĭ*, quality of being unequal to the purpose; incompleteness; defectiveness.—SYN. of 'inadequate': insufficient; unequal; incommensurate; disproportionate; incapable; incomplete.

INADMISSIBLE, a. *ĭn'ăd-mĭs'sĭ-bl* [F. *inadmissible:* L. *in*, not, and Eng. *admissible*]: not proper to be allowed or received; that cannot be received. IN'ADMIS'SIBIL'ITY, n. *-bĭl'ĭ-tĭ*, the quality of being inadmissible.

INADVERTENT, a. *ĭn'ăd-vĕr'tĕnt* [mid. L. *inadverten'tĭă*, inadvertence—from L. *in*, not; *advert'ens*, directing or turning toward: F. *inadvertance;* Sp. *inadvertencia*, carelessness, heedlessness]: heedless; not turning the mind to; inconsiderate; careless. IN'ADVER'TENTLY, ad. *-lĭ.* IN'ADVER'TENCE, n. *-tĕns*, or IN'ADVER'TENCY, n. *-tĕn-sĭ*, oversight; mistake; any mistake or fault from want of forethought; heedlessness—SYN. of 'inadvertency': thoughtlessness; inattention; carelessness; negligence.

INAGUA, *ē-nâ'gwâ*, GREAT AND LITTLE: two most southerly islands of the Bahama group. The Great Inagua (50 m. long, 25 m. wide), is remarkable for having its longer dimension almost at right angles to those of the rest of the cluster. The Little Inagua lies about 12 m. n., and measures 8 m. by 6. Pop. of both islands, about 1,000, of whom only a few are white.

INAJA PALM, *ĭn-â'ja* (*Maximiliana regia*): S. American palm, common in the countries near the Amazon; having a lofty, massive stem; very long, drooping, pin-

nate leaves, with leaflets in groups of three, four, or five at intervals along the midrib, from which they stand out in different directions; numerous spadices; large woody spathes; and densely clustered elongate fruit, with a hard stony seed, a layer of soft pulp, and a tough skin. The leaves are sometimes more than 50 ft. long. The great woody spathes are used by hunters to cook meat in, and with water in them they stand the fire well enough for the purpose. They are also used as baskets and as cradles by the Indians. The fruit is eaten by the Indians, and is particularly attractive to monkeys and some kinds of birds.

INALIENABLE, a. *ĭn-āl'yĕn-ă-bl* [F. *inaliénable:* L. *in,* not, and Eng. *alienable*]: that cannot be legally or justly transferred to another. INAL'IENABLY, ad. *-ă-blĭ.* INAL'IENABLENESS, n. *-bl-nĕs.*

INAMORATO, n. *ĭn-ăm'ō-râ'tō* [It. *innamorato,* a lover—from L. *amor,* love]: a lover; one in love. INAM'-ORA'TA, n. fem. *-râ'tă,* a woman in love.

INANE, a. *ĭn-ān'* [L. *inānĭs,* empty: It. *inane*]: empty; void; useless; senseless. INANE'LY, ad. *-lĭ.* IN-ANITY, n. *ĭn-ăn'ĭ-tĭ* [F. *inanité*]: emptiness; vanity. INAN'ITIES, n. plu. *-ĭ-tĭz,* vanities; sillinesses. INANITION, n. *ĭn'ă-nĭsh'ŭn* [F.]: emptiness; want of fulness; starvation; a condition of starvation brought about by bad food, or food deficient in quantity: see STARVATION.

INANIMATE, a. *ĭn-ăn'ĭ-māt* [L. *inanĭmātus,* lifeless—from *in,* not; *anĭmātus,* living: It. *inanimato*]: destitute of life; dead; lifeless; dull; inactive; not sprightly. INAN'IMA'TION, n. *-mā'shŭn,* lifelessness.—SYN. of 'inanimate': spiritless; inert; soulless.

INANTHERATE, a. *ĭn-ăn'thĕr-āt:* in *bot.,* destitute of an anther; used of a sterile or abortive stamen.

INAPPETENCE, n. *ĭn-ăp'pĕ-tĕns,* or INAP'PETENCY, n. *-tĕn-sĭ* [F. *inappétence: in,* not, and Eng. *appetence*]: want of desire to imbibe nourishment; want of inclination.

INAPPLICABLE, a. *ĭn-ăp'plĭ-kă-bl* [F. *inapplicable:* L. *in,* not, and Eng. *applicable*]: not suited or suitable to the purpose; unadapted. INAPPLICATION, n. *ĭn-ăp'plĭ-kā'-shŭn* [F.—L.]: want of attention; unfitness; negligence; neglect of study or industry. INAP'PLICABIL'ITY, n. *-bĭl'ĭ-tĭ,* the state or quality of being inapplicable.—SYN. of 'inapplicable': unsuitable; unsuited; inapposite; inappropriate.

INAPPRECIABLE, a. *ĭn'ăp-prē'shĭ-ă-bl* [F. *inappréciable: in,* not, and Eng. *appreciable*]: that cannot be duly valued; not to be estimated or ascertained.

INAPPREHENSIBLE, a. *ĭn-ăp'prĕ-hĕn'sĭ-bl* [*in,* not, and *apprehensible*]: not intelligible. INAP'PREHEN'SIVE, a. *-sĭv,* slow in apprehending; regardless.

INAPPROACHABLE, a. *ĭn'ăp-prōch'ă-bl* [*in*, not, and *approachable*]: not to be approached; inaccessible.

INAPPROPRIATE, a. *ĭn'ăp-prō'prĭ-āt* [*in*, not and *appropriate*]: unsuited; not proper. IN'APPRO'PRIATELY, ad. *-lĭ*. IN'APPRO'PRIATENESS, n.

INAPT, a. *ĭn-ăpt'* [L. *ineptus*, improper, inconsistent—from *in*, not; *aptus*, fit]: not apt. INAPT'LY, ad. *-lĭ*. INAP'TITUDE, n. *-tĭ-tūd* [F.—L.], or INAPT'NESS, n. unfitness; unsuitableness.

INARCH, v. *ĭn-ârch'* [L. *in*, into; *arcŭō*, I bend like a bow]: to graft by uniting a growing plant or branch to a neighboring stock without separating it from the earth or from the parent tree. Branches growing across one another sometimes become inarched of themselves; and it is probable that an observation of such growth first led to the invention of grafting. Inarching is practiced in cases in which the ordinary modes of grafting are not found readily to succeed, as with camellias. The stocks to be grafted upon are planted, or placed in pots, around the plant from which the grafts are to be taken. Four or five months are generally sufficient to complete the union; but sometimes two years are necessary. When the union is complete, the scion is separated by a sloping cut from its parent plant. Care must always be taken that the parts to be joined together be cut to fit one another as exactly as possible, and they are then firmly tied together, and so covered that neither air nor water may penetrate. It is desirable that they be branches of nearly the same thickness. They should be cut almost down to the pith, but the pith must not be injured. Inarching is performed in spring, after sap has begun to circulate.

INARTICULATE, a. *ĭn'âr-tĭk'ū-lāt* [L. *in*, not; *articŭlātus*, furnished with joints—from *articŭlŭs*, a joint, as of the body: F. *inarticulé*, inarticulate (see ARTICULATE)]: not uttered with a distinct spoken sound; in *bot.*, without joints or interruption to continuity. IN'ARTIC'ULATELY, ad. *-lĭ*. IN'ARTIC'ULATENESS, n. or IN'ARTIC'ULA'TION, n. *-lā'shŭn*, indistinctness of spoken sounds.

INARTIFICIAL, a. *ĭn-âr'tĭ-fĭsh'ăl* [*in*, not, and *artificial*]: not done by art; simple; natural; artless. INAR'TIFI'CIALLY, ad. *-lĭ*.

INASMUCH, ad. or conj. *ĭn-ăz-mŭch'* [*in*, *as*, and *much*]: seeing that; this being the fact.—SYN.: since; because; for; as.

INATTENTION, in Psychology. See ATTENTION.

INATTENTIVE, a. *ĭn'ăt-tĕn'tĭv* [F. *inattentif*, inattentive: *in*, not, and Eng. *attentive*]: careless; negligent; not fixing the mind on. IN'ATTEN'TIVELY, ad. *-lĭ*. IN'ATTENTION, n. *-shŭn* [F.—L.]: the want of fixing the mind steadily on; neglect.—SYN. of 'inattention': inadvertency; thoughtlessness; heedlessness;—of 'inattentive'; thoughtless; heedless; remiss; regardless.

INAUDIBLE, a. *ĭn-āw'dĭ-bl* [L. *in*, not, and *audible*]: that cannot be heard; wanting in distinctness of sound. INAU'DIBLY, ad. *-blĭ*. INAU'DIBIL'ITY, n. *-bĭl'ĭ-tĭ*, or INAU'DIBLENESS, n. *-bl-nĕs*, state or quality of not being heard.

INAUGURAL, a. *ĭn-aw'gū-răl* [F. *inaugural*—from *inaugurer*, to inaugurate—from L. *inaugŭrārĕ*, to consult the divining birds, to inaugurate; *inaugŭrātus*, inaugurated—from *in*, into; L. *augur*, a soothsayer; *augŭro*, I presage or divine, as the success of any enterprise]: pertaining to inauguration; made or done at the introduction to an office, or at the beginning of an enterprise, as an inaugural address. INAU'GURATE, v. *-gū-rāt*, to begin with suitable ceremonies, with good omens; to invest with an office in a formal manner. INAU'GURATING, imp. INAU'GURATED, pp. INAU'GURATOR, n. *-rā-tėr*, one who. INAU'GURA'TION, n. *-rā'shŭn* [F.—L.]: the act of investing with an office with suitable solemnity; the solemn or formal beginning of any movement or course of action; the opening in a formal manner of a public building. INAU'GURATORY, n. *-tėr-ĭ*, pertaining to inauguration

INAUSPICIOUS, a. *ĭn'aw-spĭsh'ŭs* [*in*, not, and *auspicious*]: unlucky; unfavorable; ill-omened; unfortunate. IN'AUSPI'CIOUSLY, ad. *-lĭ*. IN'AUSPI'CIOUSNESS, n.

INBOARD, a. or ad. *ĭn'bōrd* [*in*, into and *board*]: applied to anything within the hold of a ship.

INBOND, a. *ĭn'bŏnd;* in *arch.*, term applied to a stone or brick laid lengthwise across a wall; as distinguished from *outbond*, in which it is laid with its length parallel to the face of the wall. An *inbond* and *outbond* wall is one in which the stones or bricks are laid alternately across and in the direction of the face of the wall.

INBORN, a. *ĭn'bŏrn* [*in*, into, within, and *born*]: implanted by nature; innate.—SYN.: inbred; inherent; natural.

INCA, n. *ĭng'kă:* the king or prince of Peru before its conquest by the Spaniards: see PERU.

INCAGE, v. *ĭn-kāj'* [F. *encager*, to incage: F. *en* for L. *in*, in, and *cage*]: to confine, as in a cage; to coop up. INCA'GING, imp. INCAGED', pp. *-kājd'*.

INCALCULABLE, a. *ĭn-kăl'kŭ-lă-bl* [F. *incalculable: in*, not, and Eng. *calculable*]: not to be computed or reckoned. INCAL'CULABLY, ad. *-lă-blĭ*.

INCALESCENCE, n. *ĭn-ka-lĕs'sĕns*, or INCALESCENCY, n. *-sĭ:* the state of being incalescent; a growing warm; warmth; incipient heat. INCALES'CENT, a. *-sĕnt*, becoming or growing warm.

INCANDESCENT, a. *ĭn'kăn-dĕs'sĕnt* [F. *incandescent*—from L. *incandescen'tem*, becoming warm, glowing—from *in*, into, on; *candes'co*, I become of a bright glittering white: It. *incandescente*]: white or glowing with heat. INCANDES'CENCE, n. *-sĕns* [F.—L.]: the glowing

or luminous appearance which bodies assume when intensely heated.

INCANDESCENT LAMP: an electric lamp consisting essentially of a glowing filamentary conductor maintained at an incandescent temperature by a traversing electric current. See ELECTRICAL ILLUMINATION.

INCANESCENT, a. *ĭn'kă-nĕs'sĕnt* [L. *incānescen'tem,* becoming white—from *canes'cĕrĕ,* to become white or hoary]: in *bot.,* hoary or gray in appearance.

INCANOUS, a. *ĭn-kā'nus* [L. *incanus,* quite gray, hoary]: in *bot.,* hoary.

INCANTATION, n. *ĭn'kăn-tā'shŭn* [F. *incantation*—from L. *incantātĭōnem*—from *incantārĕ,* to chant a magic formula against some one—from *in,* into; *canto,* I sing; as *charm* is only a disguised form of *carmen,* song]: the act of enchanting by words of sorcery. INCAN'TATORY, a. *-tĕr-ĭ,* dealing by enchantment.—*Incantation* denotes one of the most powerful and awe-inspiring modes of magic (q. v.), viz., that resting on a belief in the mysterious power of words solemnly conceived and officially and passionately uttered.

There is in the human voice, especially in its more lofty tones, wonderful power to stir men's hearts. When to this we add that poetic utterance is a special and exceptional gift; that the language of primitive nations is crude and unmanageable, the words being as difficult to weld together as pieces of cast-iron; that it is only when the poet's mind has risen to unusual heat that he can fuse them into those rhythmical sequences that please the ear and hang together in the memory; that, in short, his art is a mystery to himself, an inspiration,—we need not wonder at the feeling with which everything in the form of verse or metre was viewed. The singing or saying of such compositions, which could thus stir the blood of the hearers, they knew not how, what other effects might it not produce. Accordingly, there is no end to the power ascribed to incantations, especially when accompanied, as they generally were, with the concocting of drugs and other magical rites. They could heal or kill. If they could not raise from the dead, they could make the dead speak, or 'call up spirits from the vasty deep,' to unveil the future. They could extinguish fire; darken the sun or moon; make fetters burst, a door or a mountain fly open; blunt a sword; make a limb powerless; destroy a crop, or charm it away into another's field.

The prayers of heathens, whether for blessings or for curses, partake largely of the nature of magical incantations. They are not supposed to act as petitions addressed to a free agent, but by an inherent force which even the gods cannot resist. This notion is prominent in Hinduism and Buddhism; but it more or less disguisedly pervades all superstitious worship. For almost every occasion or operation of life there were appropriate formulas

to be repeated in order to secure success; and many of these, with that reverence for antiquity and that conservative tendency which always characterize superstition, continue to live in popular memory, though often the words are grotesque or absurd, or so old as to be unintelligible. The Romans, in the days of Cato, used incantations for curing dislocations, full of words whose meaning had been lost. A form of words used to this day in Shetland for healing a sprain can be traced back to the 10th c. In its earliest form, as found in an old German manuscript, it relates how Woden and Baldur riding out to hunt, Baldur's horse dislocated its foot, and how Woden, using charmed words, set bone to bone, etc., and so healed the foot. The repetition of this rhymed narration acted as a charm to heal other lame horses. The modern version of this tradition, as current in Norway, makes the accident happen to the horse of the *Lord Jesus*, who himself performs the cure. In Shetland, also, it is the Lord, meaning Jesus, that is substituted for Woden; and the formula is applied to healing the limbs of persons as well as those of horses. The operation is thus described in R. Chambers's *Popular Rhymes of Scotland:* 'When a person has received a sprain, it is customary to apply to an individual practised in casting the "wresting-thread." This is a thread spun from black wool, on which are cast nine knots, and tied round a sprained leg or arm. During the time the operator is putting the thread round the affected limb, he says, but in such a tone of voice as not to be heard by the bystanders, nor even by the person operated upon:

Our Lord rade
His foal's foot slade;
Down he lighted,
His foal's foot righted.
Bone to bone,
Sinew to sinew,
Blood to blood,
Flesh to flesh.
Heal, in name of the Father, Son, and Holy Ghost.'

INCAPABLE, a. *ĭn-kā'pă-bl* [F. *incapable: in,* not, and Eng. *capable*]: unable; unequal to; disqualified by disposition or law; that cannot stoop or condescend to, as to a falsehood: N. one insufficiently able to exercise his mental, moral, or physical powers; an inebriate. INCA'PABLY, ad. *-blĭ.* INCA'PABIL'ITY, n. *-bĭl'ĭ-tĭ,* natural inability; legal disqualification.—SYN. of 'incapable': incompetent; disqualified; unfit; deficient; insufficient.

INCAPACIOUS, a. *ĭn'kă-pā'shŭs* [*in,* not, and *capacious:* L. *in,* not; *capacĭtas,* largeness]: not large or spacious. IN'CAPA'CIOUSNESS, n. *-nĕs.* IN'CAPAC'ITATE, v. *-păs'ĭ-tāt,* to render incapable, unable, or unfit; to disqualify. IN'CAPAC'ITATING, imp. IN'CAPAC'ITATED, pp. INCAPAC'ITY, n. *-ĭ-tĭ* [F. *incapacité*]: want of natural power to receive, contain, or understand—applied to the mind; defect of understanding; inability; disqualifica-

tion.—SYN. of 'incapacity': unfitness; incapability; incompetency; defect; absence; narrowness.

INCARCERATE, v. *ĭn-kâr'sĕr-āt* [mid. L. *incarcĕrātus*, put into prison: It. *incarcerare;* F. *incarcérer*, to imprison—from L. *in*, into; *carcer*, a prison: comp. Gael. *carcair*, a prison, a strong box]: to imprison; to confine in a jail. INCAR'CERATING, imp. INCAR'CERATED, pp. INCAR'CERA'TION, n. *-ā'shŭn* [F.—L.]: imprisonment; confinement.

INCARNADINE, v. *ĭn-kâr'nă-dĭn* [F. *incarnadin*, of a deep or bright carnation color: old It. *incarnadino*, flesh, color—from mid. L. *incarnātus*, clothed with flesh—from *in*, in or on; *cărō*, flesh]: in *OE.*, to dye of a red or carnation color: ADJ., flesh-colored. INCAR'NADINING, imp. INCAR'NADINED, pp. *-dĭnd.*

INCARNATE, n. *ĭn-kâr'nāt* [It. *incarnato*, made flesh; F. *incarnat*, of a flesh-color—from mid. L. *incarnātŭs*, clothed with flesh or with a body—from L. *in*, in or on; *cărō*, flesh]: clothed with flesh, embodied in flesh: V. *literally*, to clothe with flesh; to assume the human form and nature. INCAR'NATING, imp. INCAR'NATED, pp. IN'CARNA'TION, n. *-nā'shŭn* [F.—L.]: the act of assuming a human body, and taking the nature of man: in *theol.*, the union of the God-head with manhood in Christ. We read (Jn. i. 14), 'The Word became flesh;' but this is understood as signifying, not a change of nature, but an assumption of human nature into personal union with the divine nature. In accordance with Lk. i. 35, and other utterances of Scripture, the formation of the human nature of Christ is ascribed to the Holy Spirit. The reality of the human nature of Christ was much disputed in the first ages of Christianity (see DOCETÆ); but in later times the chief dispute as to the person of Christ has related to his divine nature. While the fact of the incarnation is generally asserted by all who profess Christianity, except Unitarians (q. v.), no complete philosophy of it is attempted or deemed desirable or even possible; as indeed, no complete *philosophy* of the two allied facts—the being of God and the nature of Man—has yet been found possible to human thought. Such facts are not included *within* philosophy, because to Christian thinkers in general they are the necessary basis on which any philosophical system must stand. The fact of the divine incarnation in some mode is felt to be fundamental to the whole system of Christianity. In the standard doctrine of it, it is maintained that, in union with the divine nature of the Son of God, there was and is in the person of Christ, not only a true human body, but a human 'reasonable' soul. See CHRIST, THE; CHRISTOLOGY, CHALCEDON, COUNCIL OF; JESUS CHRIST; MESSIAH; TRINITY, DOCTRINE OF THE.

INCASE, v. *ĭn-kās'* [*in*, into, and *case*]: to inclose; to cover or surround with something solid. INCA'SING, imp. INCASED, pp. *-kāst'*.

INCAUTIOUS, a. *ĭn-kaw'shŭs* [L. *incautus,* incautious, heedless: *in,* not, and Eng. *cautious*]: unwary; heedless; not attentive to probable effects and consequences. INCAU'TIOUSLY, ad. *-lĭ.* INCAU'TIOUSNESS, n. *-nĕs,* want of caution; want of foresight; heedlessness.—SYN. of 'incautious': indiscreet; imprudent; inconsiderate; thoughtless; improvident; negligent; careless; impolitic.

INCENDIARY, n. *ĭn-sĕn'dĭ-ă-rĭ* [F. *incendiaire,* incendiary—from L. *incendĭārĭŭs,* an incendiary—from *incendo,* I set fire to: It. *incendiare;* F. *incendier,* to set fire to]: one who wilfully and maliciously sets fire to houses, buildings, or other property; one who so inflames the public mind as to unduly promote discontent and faction: ADJ. relating to the wilful burning of a building; inflammatory; seditious. INCEN'DIARISM, n. *-ă-rĭzm,* the act or practice of an incendiary. INCENDIARY SHELLS: see CARCASS.

INCENSANT, a. *ĭn-sĕn'sant* [L. *incenso,* a freq. from L. *incendo,* I burn]: in *her.,* a term applied to a boar when borne in a furious, angry position.

INCENSE, n. *in'sĕns* [L. *incensus,* set fire to, burnt: It. *incenso;* F. *encens,* incense—*lit.,* what is burnt]: the odors arising from certain spices, gums, etc., when thrown on fire, used in religious rites; the materials so burned; *figuratively,* the worship of prayer and praise: V. to perfume with incense. INCENSE, v. *ĭn-sĕns',* to inflame with anger; to provoke, to exasperate. INCEN'SING, imp. INCENSED', pp. *-sĕnst'.* INCEN'SIVE, a. *-sĕn'sĭv,* tending to incense or provoke. INCENSE'MENT, n. in *OE.,* rage, fury; heat.—SYN. of 'incense, v.'; to enrage; anger; irritate; fire; heat, in *OE.,* enkindle; inflame; perfume.

IN'CENSE: perfume (i. e., fumigation), the odor of which is evolved by burning, and the use of which, in public worship, prevailed in most of the ancient religions. The incense at present in use consists of some resinous base, such as gum olibanum, mingled with odoriferous gums, balsams, etc. There is no regular formula for it, almost every maker having his own peculiar recipe. The ingredients are usually olibanum, benzoin, styrax, and powdered cascarilla bark. These materials, well mingled, are so placed in the censer or thurible as to be sprinkled by falling on a hot plate, which immediately volatilizes them, and diffuses their odor through the edifice. See FRANKINCENSE.

Among the Jews, the burning of incense was employed exclusively as an act of worship and, indeed, appears to have been itself regarded as a sacred offering. The same appears in the religion of Egypt also; though the Persian sculptures exhibit the burning of incense as one of the marks of honor offered to royalty.

In the Rom. Cath. Church, and in the Eastern churches, incense is used in public worship, particularly in connection with the Eucharist service, which is regarded as

a sacrifice; but writers are not agreed as to the earliest date at which its use can be traced. St. Ambrose, in the Western Church, alludes to incense in terms which suppose the practice of burning it to be an established one, and in later writers, it is mentioned familiarly as a part of ordinary public worship. In the Rom. Cath. Church, incense is used in the solemn (or high) mass, in the consecration of churches, in solemn consecrations of objects intended for use in public worship, and in the burial of the dead. There are also minor incensations of the celebrating bishop or priest and inferior ministers; of prelates, princes, and other dignitaries officially present at the public service, and a general incensation of the whole congregation.

In the Reformed churches, the use of incense was gradually abandoned after the reign of Edward VI. with other practices which have been laid aside by them as without 'warrant of Scripture.' In the Church of England it has never been abolished by law, and in the recent ritualistic revival in that Church and in the Prot. Episc. Church in the United States, its use has in a few instances been restored.

INCENSED', or ANIMÉ, in Heraldry: epithet applied to panthers or other wild beasts borne with flames issuing from their mouths and ears.

INCENTIVE, a. *ĭn-sĕn'tĭv* [mid. L. *incentīvus*, that sings or sounds to, that stirs up or incites—from L. *incĭnō*, I sing or make music to: It. *incentivo*]: inciting; encouraging: N. that which kindles or excites; that which prompts to good or evil; a stimulus. INCEN'TIVELY, ad. *-lĭ*.—SYN. of 'incentive, n.': motive; spur; incitement; encouragement.

INCEPTIVE, a. *ĭn-sĕp'tĭv* [L. *inceptum*, a beginning—from *in*, into; *captus*, taken: It. *incepto*, begun]: beginning; denoting beginning; applied to a verb which expresses the beginning of an action, or of a course of action. INCEP'TIVELY, ad. *-lĭ*. INCEP'TOR, n. *-tėr* [L. a beginner]: a beginner; one on the point of taking the academic degree of A. M. INCEPTION, n. *ĭn-sĕp'shŭn*, beginning.

INCERTAIN, a. *ĭn-sėr'tĭn* [*in*, not, and *certain*]: in *OE.*, uncertain; doubtful. INCER'TAINTY, n. *-tĭn-tĭ*, uncertainty; doubtfulness.

INCERTITUDE, n. *ĭn-sėr'tĭ-tūd* [F. *incertitude*, uncertainty—from L. *incertĭtūdĭnem*—from *incertus*, uncertain—from *in*, not; *certus*, sure]: uncertainty; doubtfulness.

INCESSANT, a. *ĭn-sĕs'sănt* [F. *incessant*—from L. *incessan'tem:* It. *incessante;* Sp. *incesante*, incessant, continual—from L. *in*, not; *cessans*, ceasing or giving over]: continual; without interruption. INCES'SANTLY, ad. *-lĭ*.—SYN. of 'incessant': unceasing; unintermitted; uninterrupted; ceaseless; perpetual; constant.

INCEST, n. *ĭn'sĕst* [F. *inceste*—from L. *incestus*, unclean, unchaste—from *in*, not; *castus*, pure, chaste: It. *incesto*]: sexual intercourse within the prohibited degrees. INCESTUOUS, a. *ĭn-sĕs'tū-ŭs*, guilty of incest. INCES'TUOUSLY, ad. *-lĭ*. INCES'TUOUSNESS, n.

IN'CEST (Lat. *in*, not; *castus*, chaste): cohabitation between man and woman whose relation to each other by consanguinity or affinity is within the degrees where the laws prohibit marriage. The laws of Great Britain forbid the marriage of a man to his deceased wife's sister as incestuous, and for many years bills have been defeated in parliament by decreasing majorities to legalize such marriages. In the United States such marriages are of frequent occurrence and are not illegal. In Great Britain, if a man cohabits with his deceased wife's sister without or with marriage, both are guilty of incest, and the marriage is void. Cohabitation between parents and children, grandparents and grandchildren, and brothers and sisters of half or whole blood is incestuous in many of the United States, and marriage within these degrees is prohibited. Different state statutes forbid such marriages and declare the degrees of illegality. Some forbid cousins to marry, a prohibition not recognized in Europe, where royal families are continually intermarrying. Incest is not a criminal offense in England, but it is criminal in nearly all of the United States. In N. Y. it is made a felony by statute, punishable by a maximum imprisonment of 10 years.

INCH, n. *ĭnsh* [AS. *ince*, an inch; L. *uncĭă*, the twelfth part of a pound]: the twelfth part of a foot; a measure; a small quantity or degree, as to die by *inches:* ADJ. measuring an inch, as a *two-inch* board; in *OE.*, an exact or nice point of time. INCHED, a. *ĭnsht*, containing inches. INCHMEAL, in *OE.*, a piece an inch long: AD. in *OE.*, by small degrees; by piecemeal.

INCH, n. *ĭnsh* [Ir. *inis;* Gael. *innis* and *insh*, an inclosure for cattle, an island—akin to L. *insŭlă*, an island]: in *Scot.*, a small island. Inch and Innis enter into many Scotch and Irish compound names, e.g., Inchcolm (q.v.), Inniskillen.

INCHARITABLE, a.: OE. for UNCHARITABLE.

INCH'COLM (of old, 'St. Colm's Inch,' as in Shakespeare's *Macbeth*, act i. sc. 2; in Lat. *Æmonia*, and *Insula Sancti Columbæ*): islet, beautifully situated in the Firth of Forth, within sight of Edinburgh. It is separated from the north or Fife shore by a channel less than a mile broad, called 'Mortimer's Deep.' The isle is somewhat more than half a mile in length, and less than a third of a mile broad where widest. In 1881, seven persons resided on it. It takes its name from St. Colm or Columbia (q.v.) of Iona, who is said to have dwelt here while laboring for the conversion of the Northern Picts in the 6th c. In 1123, King Alexander I. of Scotland, being

shipwrecked on it, found it inhabited by a solitary hermit, who lived on shell-fish and the milk of one cow, and served St. Columba in a little chapel or oratory. The king, in gratitude for his escape, founded on the island an abbey of Austin canons regular. Walter Bower, enlarger and continuator of the *Scotichronicon* of John of Fordun (q.v.), was abbot of the monastery 1418-49. It was repeatedly sacked by the English in the 14th, 15th, and 16th c. The buildings, long in ruins, show traces of Romanesque work (of about the middle of the 12th c.); but are chiefly First Pointed (of the 13th and 14th c.). The tower has some resemblance to the tower of Iona. The oldest edifice is a little vaulted oratory (20 ft. long by 7 broad), believed to represent the chapel in which King Alexander found the anchorite serving St. Columba in the 12th c. It is of the same type as the Irish oratory of Gallerus. It has been lately restored. There is also a chapter-house with a groined roof, and three elegant sedilia. The history of Inchcolm has been written with great detail by Prof. Sir James Y. Simpson, *Proceedings of the Antiquaries of Scotland*, II. 489-528.

INCHKEITH, *ĭnch-kēth':* island in the Firth of Forth, nearly midway between Leith and Kinghorn. It is a mile in length, and not much more than a third of a mile broad where widest. It is believed to be the site of the town or stronghold of Giudi, described by Bede (who wrote about 731) as situated in the middle of the great arm of the sea which runs into Britain from the east (that is, the Firth of Forth). From the island fortress of Giudi, the inlet in which it stood was of old called 'the sea of Giudin,' and hence also, probably, Inchkeith took its name. The island is said to have been the site of a church or monastery, founded between 679 and 704 by St. Adamnan, biographer of St. Columba, and his successor in the abbacy of Iona. Inchkeith was seized by the English 1547, when they built a fort, which, 1549, was taken by the French auxiliaries of Scotland, who gave the island the name of the 'Isle of Horses.' A light-house was built on the site of the fort 1804. New and extensive fortifications were begun by the government 1878. The island, which belongs to the Duke of Buccleuch, is part of the parish of Kinghorn, in Fife.

INCHOATE, a. *ĭn'kō-āt* [L. *inchŏātus*, founded, begun]: begun; entered upon; incipient: V. to begin. IN'CHOATING, imp. IN'CHOATED, pp. IN'CHOATE'LY, ad. *-lĭ.* IN'CHOA'TION, n. *-ā'shŭn*, the act of beginning. IN'CHOA'TIVE, a. *-ĭĭv* [F. *inchoatif*]: expressing or indicating beginning.

INCIDENCE, n. *ĭn'sĭ-dĕns* [F. *incidence*—from L. *incĭdens*, or *incĭden'tem*, a falling in or on—from *in*, in; *cadens*, falling]: a falling on or occurring; the direction in which any elastic body, or light or heat, falls on or strikes another; accessories or matters, however remote,

occurring in connection with a thing apart from its main design, as the *incidence* of a tax—for example, a tax may not really be paid by the person from whom it is actually received, as a tax on rents paid by landowners is really included in the rents exacted. ANGLE OF INCIDENCE, the angle formed by a ray, as of light or heat, striking or impinging on a surface, which angle is equal to the *angle of reflection:* see ANGLE; CATOPTRICS. IN'CIDENT, n. *-dĕnt* [F.—L.]: something which happens beside the main design; a circumstance; an occurrence; an adventure: ADJ. falling into or upon; liable to occur; casual. IN'CIDEN'TAL, a. *-dĕn'tăl,* coming without design; issuing or happening apart from the main design; happening by chance; casual; occasional; not intended. INCIDEN'TALS, n. plu. things coming or happening without design. IN'CIDEN'TALLY, ad. *-lĭ,* beside the main design; occasionally. IN'CIDENCY, n. *-dĕn-sĭ,* in *OE.*, a falling on or occurring; a casualty; incidence. INCIDENT DILIGENCE, term in Scotch law for letters issued to compel attendance of witnesses; similar to subpœna (q.v.).—SYN. of 'incident, a.': falling on; fortuitous; occasional; liable; accidental; —of 'incident, n.': event; fact; casualty; chance; accident; contingency;—of 'incidental': fortuitous; contingent; accidental.

INCINERATE, v. *ĭn-sĭn'ėr-āt* [mid. L. *incĭnĕrātus;* It. *incenerare,* to reduce to ashes—from L. *in,* into; *cinis,* or *cinĕrem,* ashes]: to burn to ashes. INCIN'ERATING, imp. INCIN'ERATED, pp. INCIN'ERA'TION, n. *-ā'shŭn* [F.—L.]: the act of burning or reducing to ashes. *Note.—Calcination* is the process of reducing to a calx or friable state by heat.

INCIPIENT, a. *ĭn-sĭp'ĭ-ĕnt* [L. *incĭpĭen'tem,* taking in hand, beginning—from *in,* in; *căpĭō,* I take: It. *incipiente,* incipient]: beginning. INCIP'IENTLY, ad. *-lĭ.* INCIP'IENCY, n. *-ĕn-sĭ.*

INCISE, v. *ĭn-sīz'* [F. *inciser,* to cut in, to incise—from L. *incīsus,* cut into—from *in, cædĕrĕ,* to cut]: to cut in or into; to carve; to engrave. INCI'SING, imp. INCISED', pp. *-sīzd':* ADJ. cut down deeply; cut in. INCI'SOR, n. *-sī'zer,* one of the cutting or fore teeth; a cutter. INCISION, n. *ĭn-sĭzh'ŭn* [F.—L.]: the act of cutting into a substance; a cut; a gash. INCISIVE, a. *ĭn-sī-sĭv* [F. *incisif*]: also INCI'SORY, a. *-zėr-ĭ,* having the quality of cutting; situated near the incisor teeth, or relating to them. INCI'SIVE, a. that cuts into; that strikes into, opens up, and makes clear; sharp; trenchant; sarcastic. INCISURE, n. *ĭn-sĭzh'ôr* [L. *incīsūrā,* a cutting into]: a cut; an incision. INCISIVE-BONES, n. the bones of the upper jaw containing the incisors; the premaxillary bones.

INCITE, v. *ĭn-sīt'* [F. *inciter*—from L. *incĭtārĕ,* to urge on—from *in,* into; *citārĕ,* to put into quick motion: It. *incitare*]: to rouse or move the mind to action; to spur on; to encourage or instigate. INCI'TING, imp. INCI'TED, pp. INCI'TER, n. one who. INCITATION, n. *ĭn'sĭ-*

tā-shŭn [F.—L.]: the act of inciting; that which excites to action; motive; incentive. INCITE'MENT, n. *-mĕnt* [F.—L.]: that which moves to action; impulse. INCI'TINGLY, ad. *-lĭ.*—SYN. of 'incite': to excite; arouse; awaken; stimulate; instigate; spur; goad; urge; provoke; encourage; prompt; animate;—of 'incitement': motive; encouragement; incentive; spur; stimulus.

INCIVILITY, n. *ĭn'sĭ-vĭl'ĭ-tĭ* [F. *incivilité*—from L. *in,* not; *civīlĭtas,* courtesy, humanity]: want of courtesy; rudeness of manners; any act of ill-breeding. INCIVIL'ITIES, n. plu. *-ĭ-tĭz,* acts of discourtesy.—SYN. of 'incivility': discourtesy; impoliteness; disrespect; uncourteousness; rudeness; unmannerliness.

INCLAUDENT, a. *ĭn-klaw'dĕnt* [prefix *in,* not; L. *claudo,* I close]: in *bot.,* not closing.

INCLAVATED, a. *ĭn'klă-vā-tĕd* [L. *in,* into; *clāvŭs,* a nail or spike]: locked in; fast fixed. INCLAVE, a. *ĭn'klāv,* dovetailed; resembling a dovetailed joint.

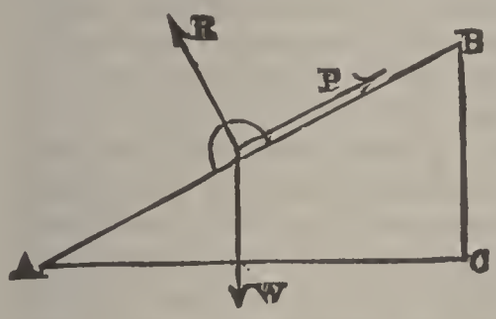
INCLEMENT, a. *ĭn-klĕm'ĕnt* [F. *inclément*—from L. *inclēmen'tem,* unmerciful, severe—from *in,* not; *clemens,* mild, gentle: It. *inclemente*]: harsh; unpitying; rough; stormy. INCLEM'ENTLY, ad. *-lĭ.* INCLEM-ENCY, n. *-ĕn-sĭ* [F. *inclémence*]: roughness; storminess; harshness; severity; want of tenderness or mercy. *Note.*—INCLEMENT and INCLEMENCY are now usually restricted in their application to the weather.

INCLINE, v. *ĭn-klīn'* [F. *incliner*—from L. *inclīnārĕ,* to bend or bow in any direction—from *in,* into; L. *clino;* Gr. *klinō,* I bend or lean: comp. Gael. *claon,* oblique, to go wrong]: to bend; to lean from an erect or parallel line; to slope; to be disposed; to turn the desire toward: N. a slope; a gradient, as of a railway. INCLI'NING, imp.: ADJ. leaning; sloping. INCLINED', pp. *-klīnd':* ADJ. deviating or leaning from the perpendicular; sloping; disposed. INCLI'NABLE, a. *-nă-bl,* leaning; tending; favorably disposed. INCLI'NABLENESS, n. *-bl-nĕs.* INCLINATION, n. *ĭn'klĭ-nā'shŭn* [F.—L.]: a bending or sloping either downward or upward; the direction of one body with respect to another when measured by the angle formed at the point of meeting; tendency or leaning toward; bias of mind or will; propensity; desire; love. IN'CLINOM'ETER, n. *-nŏm'ĕ-tĕr* [Gr. *metron,* a measure]: an instrument for measuring the vertical elements of the magnetic force.—SYN. of 'inclination': deviation from; bent; a leaning; bias; turn; tendency; proneness; disposition; prepossession; predilection; attachment; affection; regard.

INCLINED ENGINE, or INCLINED CYLINDER ENGINE: a form of marine engine in which the cylinders are inclined toward each other at an angle of about 120 degrees, and make a triangle with the base. They are connected by cranks to a common crank-shaft.

INCLINED PLANE, THE: a sloping surface, as on a

road, or as the side of a knife-blade; reckoned one of the five Mechanical Powers (q.v.), because, by its aid, operations may be performed which would be difficult or impossible without it; e.g., a man may roll up a plane a weight which he could not lift. This principle is extensively applied, in cutting, in splitting, and chiefly in the raising of weights and in road-making. For a mathematical investigation of the theory of the inclined plane, see the common books on mechanics; the result is as follows: The force required to lift a body (viz., its weight) bears to the force required to keep it from rolling down an inclined plane, the same proportion that the length of the inclined plane bears to its height; also the weight of the body bears to the weight which tends to bend or break the inclined plane, the same proportion that the length of the plane bears to its base. Let us suppose an inclined plane whose length, AB, is 13 ft.; base, AC, 12 ft.; and height, BC, 5 ft.; and let the weight be 780 lbs. Then the force P, which can sustain 780 lbs. on the inclined plane, is $\frac{5}{13}$ of 780, or 300 lbs. (i.e., a force which would just lift 300 pounds); also the force R, which presses perpendicularly on the plane, is $\frac{12}{13}$ of 780, or 720 pounds. When the weight has not only to be sustained on the plane but also drawn up it, the resistance of friction (q.v.) has to be added to the power necessary to sustain the weight. In common roads, engineers are agreed that the height of an incline should not exceed $\frac{1}{20}$ of the length, or, as they phrase it, the *gradient* should not be greater than one in 20. Knives, chisels, axes, wedges, and screws, are merely modifications of the inclined plane; but for the last two, generally classed as distinct mechanical powers, see the respective titles.



INCLOSE, v. *ĭn-klōz′*, or ENCLOSE′ [*in*, into, and *close*: F. *enclos*, an inclosure; *inclus*, inclosed—from L. *inclūsŭs*; It. *incluso*, inclosed, shut up]: to shut in; to confine on all sides; to cover with a wrapper or envelope; to separate land by a fence. INCLO′SING, imp. INCLOSED′, pp. *-klōzd′*: ADJ. surrounded; confined on all sides; covered, as with a case or envelope. INCLO′SURE, n. *-klō′zhûr*, the act of inclosing; a space shut in, or separated from others; that which is contained in a wrapper or envelope. —SYN. of 'inclose': to limit; bound; circumscribe; restrict; include; surround; environ; encompass; confine; restrain; encircle; envelop.

INCLUDE, v. *ĭn-klôd′* [L. *inclūdĕrĕ*, to shut up or in —from *in*, in; *claudo*, I shut: It. *includere*, to inclose]: to contain; to comprise; to comprehend. INCLU′DING, *imp.* INCLU′DED, pp. INCLUSION, n. *ĭn-klô′shŭn* [L. *in-*

clūsĭōncm, a shutting up]: the act of including. INCLU'-SIVE, a. *-sĭv*, comprehended in the number or sum; in *OE.*, inclosing; encircling. INCLU'SIVELY, ad. *-lĭ*, in a manner so as to include.—SYN. of 'include': to embrace; imply; involve; hold.

INCLUSA, n. *ĭn-klō'sa* [L. *includo*, I shut in]: in *zool.*, in Cuvier's classification, the fifth family of *Testaccous Acephala.* It consisted of bivalve mollusks, with a double tube projecting from the gaping shell.

INCOAGULABLE, a. *ĭn'kō-ăg'ū-lă-bl* [L. *in*, not, and *coagulable*]: that cannot be coagulated.

IN CŒ'NA DO'MINI [Lat. *At the Lord's Supper*, so called from the ancient day of its annual publication, Holy Thursday, the anniversary of the institution of the Supper]: celebrated papal bull. It is not, as other bulls, the work of a single pope, but with additions and modifications at various times, dates from the middle ages; some writers tracing it to Martin V., some to Clement V., others to Boniface VIII. Its present form it received from Popes Julius II., Paul III., and finally Urban VIII., 1627, from which year it continued for a century and a half to be published annually on Holy Thursday, or on Easter Monday. The contents of this bull have been a fertile subject of controversy. It was a summary of ecclesiastical censures, especially of those with which grievous violation of the faith of the church, or of the rights of the church or of the Roman see are visited; excommunication being denounced against Wickliffites, Hussites, Lutherans, and all guilty of heresy, schism, sacrilege, usurpation of the rights of the church or of the pope, forcible and unlawful source of church property, personal violence against ecclesiastics, unlawful interruption of the free intercourse of the faithful with Rome, etc. The bull, though mainly dealing with offenses against the church, denounces under similar censures other crimes, e.g., piracy, plunder of shipwrecked goods, forgery, etc. This bull, being regarded by most of the crowned heads of Europe as an infringement of their rights, encountered in the 17th c. the determined opposition of nearly all the courts, even those most favorable to Rome; and at length, 1770, Clement XIV. discontinued its publication, which has never since been renewed.

INCOG, ad. *ĭn-kŏg'* [L. *incog'nĭtus*, unknown—from *in*, not; *cognĭtus*, known: It. *incognito*, unknown]: the contracted form of INCOGNITO, ad. *ĭn-kŏg'nĭ-tō*, in disguise; privately; in concealment.

INCOGNIZABLE, a. *ĭn-kŏg'nĭ-ză-bl* or *ĭn-kŏn'ĭ-ză-bl* [*in*, not, and *cognizable*]: that cannot be known or distinguished.

INCOHERENT, a. *ĭn'kō-hē'rĕnt* [F. *incohérent*—from mid. L. *incohæren'tem*—from L. *in*, not; *cohærērĕ*, to be united, to adhere]: not being united; loose; unconnected; having no dependence of one part on another, as the

speech of a madman. IN'COHE'RENCE, n. *-rĕns* [F.—L.]: or IN'COHE'RENCY, n. *-sĭ*, looseness of material parts; want of connection; incongruity; want of dependence of one part upon another. IN'COHE'RENTLY, ad. *-lĭ*.—SYN. of 'incoherent': incongruous; inconsistent; incompatible.

INCOMBUSTIBLE, a. *in'kŏm-bŭs'tĭ-bl* [F. *incombustible*—from L. *in*, not; mid. L. *combustĭb'ĭlĭs*, combustible (see COMBUSTIBLE)]: that cannot be burnt or consumed by fire. IN'COMBUS'TIBLY, ad. *-tĭ-blĭ*. IN'COMBUS'TIBLENESS, n. *-bl-nĕs*, also IN'COMBUS'TIBIL'ITY, n. *-bĭl'ĭ-tĭ*, the quality of not being able to be burnt.—*Incombustible Fabrics* have of late years been somewhat sought for, as a protection from death or injury by ignition of clothing, though the search after some means of rendering garments incombustible dates from a very early period (see Beckmann's *History of Inventions*). After many attempts by Gay-Lussac and other chemists, Messrs. Versmann and Oppenheim communicated to the British Assoc. at Aberdeen, 1859, the results of a series of experiments for rendering linen, calico, muslin, and all other vegetable fibres uninflammable. Silks, worsteds, and animal fibres may be ignited and charred, but they do not burst into flame, because the gases they yield are not inflammable; vegetable fibres, on the other hand, largely evolve carburetted hydrogen. These experimenters found that many salts possessed this power, but that some of these injured the fabric, spoiled the color, or were too expensive for general use. Two, however, tungstate of soda and sulphate of ammonia, produced the best results without injuring the tissue or color of the fabric. The first of these acts physically by preventing contact with the air, and does not interfere with the processes of ironing and starching; it is, therefore, preferable for goods requiring washing. The best method of applying it is by mixing in the proportion of 4 ounces of tungstate of soda to 1 dram of phosphate of soda (to prevent the formation of a partially insoluble bitungstate), and dissolving the whole in an imperial pint of water. For fabrics which are worn without previous washing, sulphate of ammonia is preferable, and a solution containing 7 per cent. of the crystalline salt is a perfect preservative. In printed muslins of a madder purple, a slight paleness of color is produced, but in no other case is the color affected, nor does it interfere with the ironing process. The incombustible fabrics of the ancients were of Asbestos (q.v.).

INCOME, n. *ĭn'kŭm* [*in*, into, and *come*]: that which comes in from labor or business; gain, profit, or interest, as from labor, business, or property; a stipend; revenue. IN'COMING, a. coming in. IN'COMINGS, n. plu. *-ĭngz*, receipts; gains.

IN'COME-TAX: tax on all persons having incomes above a certain amount, whether from lands or labor. In

Britain, various acts have passed from time to time to impose this tax—the first introduced by Pitt, and revived, 1842, by Sir Robert Peel, since which date it has been continued—the fairness and public policy of which have given rise to long controversy. Incomes below £100 are exempt. It is said that one-sixth of the British revenue is from the income tax. This kind of tax is unpopular in Britain and the United States. In the United States there was an income tax under the pressure of the great war debt, from 1863 to the end of 1871, when it was abolished. Incomes of $600 and less were exempt; later, of $1,000 and less; still later of $2,000 and less. The rate was, on incomes under $5,000, 5 per cent.; $5,000 to $10,000, 7 per cent.; above $10,000, 10 per cent. In 1870, $26,153,000 was thus raised. See TAXATION.

IN COMMENDAM, *ĭn kŏm-mĕnd'ăm* [L. into trust]: a vacant church living, as intrusted to the charge of a qualified person till it can be supplied with an incumbent.

INCOMMENSURABLE, a. *ĭn'kŏm-mĕn'sū-ră-bl* [F. *incommensurable*—from L. *incommensūrābĭlĭs: in,* and Eng. *commensurable*]: having no common measure or standard of comparison, as the side of a square and its diagonal. IN'COMMEN'SURABLES, n. plu. *-ră-blz,* incommensurable quantities. IN'COMMEN'SURABLY, ad. *-blĭ.* IN'COMMEN'SURABIL'ITY, n. *-bĭl'ĭ-tĭ* [F. *incommensurabilité*]: quality or state of being incommensurable. IN'COMMEN'SURATE, a. *-sū-rāt* [*in,* not, and *commensurate*]: not admitting of a common measure; not adequate; insufficient. IN'COMMEN'SURATELY, ad. *-lĭ.*

INCOMMEN'SURABLE MAG'NITUDES, or INCOMMEN'SURABLE QUAN'TITIES: those which have no common measure, i.e., are not, both of them, integral multiples of the same unit, however small that unit be taken. Examples of incommensurable magnitudes are abundant in mathematical science: Thus, the side and diagonal of a square; the diameter and circumference, or diameter and area of a circle, etc.; 2 and $\sqrt{3}$; $\sqrt{5}$ and $\sqrt{7}$, etc.

INCOMMISCIBLE, a. *ĭn'kŏm-mĭs'sĭ-bl* [L. *in,* not; *con,* together; *miscĕō,* I mix]: that cannot be mixed together.

INCOMMODE, v. *ĭn'kŏm-mōd'* [F. *incommode,* inconvenient, troublesome—from L. *incommŏdus,* inconvenient, unsuitable—from *in,* not; *commŏdus,* complete, perfect, fit—from *mŏdus,* a measure: It. *incommodo*]: to give trouble to; to disturb or disquiet without any great injury. INCOMMO'DING, imp. IN'COMMO'DED, pp. IN'COMMO'DIOUS, a. *-dĭ-ŭs,* inconvenient; giving trouble without much injury. IN'COMMO'DIOUSLY, ad. *-lĭ.* IN'COMMO'DIOUSNESS, n.—SYN. of 'incommode': to inconvenience; disturb; annoy; molest; trouble; worry; disquiet; vex; embarrass.

INCOMMUNICABLE, a. *ĭn'kŏm-mū'nĭ-kă-bl* [F. *incommunicable*—from mid. L. *incommunicab'ĭlĭs: in,* not

and *communicable*]: that cannot be imparted or revealed to others. IN'COMMU'NICABLY, ad. *-kă-blĭ.* IN'COMMU'NICABLENESS, n. *-kă-bl-nĕs,* or IN'COMMU'NICABIL'ITY, n. *-bĭl'ĭ-tĭ.* IN'COMMU'NICATING, imp. having no intercourse with each other. IN'COMMU'NICATED, pp. *-kā-tĕd,* not imparted. IN'COMMU'NICATIVE, a. *-tĭv,* not free or apt to impart to others in conversation.

INCOMMUTABLE, a. *ĭn'kŏm-mū'tă-bl* [F. *incommutable*—from mid. L. *incommutābĭlĭs: in,* not, and Eng. *commutable*]: not to be exchanged or commuted with another. IN'COMMU'TABLY, ad. *-blĭ.* IN'COMMU'TABIL'ITY, n. *-bĭl'ĭ-tĭ* [F. *incommutabilité*]: or IN'COMMU'TABLENESS, n. *-bl-nĕs,* unchangeableness.

INCOMPARABLE, a. *ĭn-kŏm'pă-ră-bl* [F. *incomparable*—from mid. L. *incomparābĭlĭs: in,* not, and Eng. *comparable*]: that admits of no comparison with others; without peer or equal. INCOM'PARABLY, ad. *-ră-blĭ,* beyond comparison; without competition. INCOM'PARABLENESS, n. *-bl-nĕs,* excellent beyond comparison.

INCOMPATIBLE, a. *ĭn'kŏm-păt'ĭ-bl* [F. *incompatible: in,* not, and Eng. *compatible*]: that cannot subsist with something else; in *phar.,* term used of medicines not suitable to be prescribed together, because one would counteract the effect of the other; in *chem.,* one of two or more salts or other substances which cannot be united in solution without decomposition or chemical change. IN'COMPAT'IBLY, ad. *-blĭ.* IN'COMPAT'IBLENESS, n. *-bl-nĕs,* or IN'COMPAT'IBIL'ITY, n. *-bĭl'ĭ-tĭ* [F. *incompatibilité*]: irreconcilable disagreement. IN'COMPAT'IBLES, n. plu. *-ĭ-blz,* in *chem.,* salts or compounds which decompose each other when brought in contact in solution. INCOMPATIBLE-TERMS, in *logic,* terms which cannot be affirmed of the same subject.—SYN. of 'incompatible': incongruous; inconsistent; incoherent; dissimilar; discordant; irreconcilable; repugnant; contradictory.

INCOMPETENT, a. *ĭn-kŏm'pĕ-tĕnt* [F. *incompétent*—from mid. L. *incompĕten'tem: in,* not, and Eng. *competent*]: wanting adequate powers of mind, or suitable faculties; wanting the legal ability. INCOM'PETENTLY, ad. *-lĭ.* INCOM'PETENCE, n. *-tĕns* [F.—L.]:, or INCOM'PETENCY, n. *-tĕn-sĭ,* want of sufficient powers; inability. —SYN. of 'incompetent': incapable; inadequate; insufficient; unable; improper; unfit; disqualified.

INCOMPLETE, a. *ĭn'kŏm-plēt'* [F. *incomplet*—from mid. L. *incomplētus: in,* not, and Eng. *complete*]: not finished; imperfect; defective; in *bot.,* destitute of some organ. IN'COMPLETE'LY, ad. *-lĭ.* IN'COMPLETE'NESS, n. imperfection; unfinished state.

INCOMPLIABLE, a. *ĭn'kŏm-plī'ă-bl* [*in,* not, and *compliable*]: not compliable. IN'COMPLI'ANT, a. *-plī'ănt* [*in,* not, and *compliant*]: not disposed to comply or yield to solicitation. IN'COMPLI'ANCE, n. *-plī-ăns,* want of compliance.

INCOMPREHENSIBLE, a. *ĭn-kŏm'prĕ-hĕn'sĭ-bl* [F. *incomprehensible*—from mid. L. *incomprĕhensĭb'ĭlĭs: in,* not, and Eng. *comprehensible*]: that cannot be understood; beyond the reach of human intellect. INCOM'PREHEN'SIBLY, ad. *-blĭ.* INCOM'PREHEN'SIBLENESS, n. *-bl-nĕs,* or INCOM'PREHEN'SIBIL'ITY, n. *-bĭl'ĭ-tĭ* [F. *incompréhensibilité*]: the quality of being beyond the reach of human intellect. INCOM'PREHEN'SION, n. *-shŭn* [F.—L.]: want of comprehension or understanding. INCOM'PREHEN'SIVE, a. *-sĭv,* not capable of including or understanding; not extensive.

INCOMPRESSIBLE, a. *ĭn'kŏm-prĕs'sĭ-bl* [F. *incompressible*—from mid. L. *incompressĭb'ĭlĭs: in,* not, and Eng. *compressible*]: not capable of being reduced by force to a smaller compass. IN'COMPRES'SIBIL'ITY, n. *-bĭl'ĭ-tĭ.*

INCOMPUTABLE, a. *ĭn'kŏm-pū'tă-bl* [*in.* not, and *computable*]: that cannot be reckoned.

INCONCEIVABLE, a. *ĭn'kŏn-sēv'ă-bl* [F. *inconcevable: in,* not, and Eng. *conceivable*]: that cannot be imagined; incomprehensible. IN'CONCEIV'ABLY, ad. *-blĭ.* IN'CONCEIV'ABLENESS, n. *-bl-nĕs,* quality or state of being inconceivable; incomprehensibility.

INCONCLUSIVE, a. *ĭn'kŏn-klô'zĭv* [L. *in,* not, and *conclusive*]: not closing or settling a point in debate or a doubtful question; not exhibiting cogent or satisfactory evidence. IN'CONCLU'SIVELY, ad. *-lĭ.* IN'CONCLU'SIVENESS, n. want of such evidence as would satisfy the mind.

INCONDENSABLE, a. *ĭn'kŏn-dĕn'să-bl* [L. *in,* not, and *condensable*]: that cannot be reduced to a less compass, or converted from a gas or vapor to a liquid or solid. IN'CONDEN'SABIL'ITY, n. *-bĭl'ĭ-tĭ.*

INCONGEALABLE, a. *ĭn'kŏn-jēl'ă-bl* [L. *in,* not, and *congealable*]: not capable of being frozen. IN'CONGEAL'ABLENESS, n. *-bl-nĕs.*

INCONGRUENT, a. *ĭn-kŏn'grô-ĕnt* [L. *incongrŭen'tem,* inconsistent, unsuitable: It. *incongruo* and *incongruente,* incongruous: F. *incongru*]: unsuitable; inconsistent. IN'CONGRU'ITY, n. *-grô'ĭ-tĭ* [F. *incongruité*]: unsuitableness; absurdity; inconsistency; disagreement of parts. INCON'GRUOUS, a. *-kŏn'grô-ŭs* [L. *incongrŭŭs*]: unsuitable; not fitting; improper. INCON'GRUOUSLY, ad. *-lĭ.*—SYN. of 'incongruous': incoherent; inconsistent; incompatible; unsuited; inappropriate; unfit.

INCONSEQUENT, a. *ĭn-kŏn'sĕ-kwĕnt* [F. *inconséquent*—from mid. L. *inconsĕquen'tem,* not logically consequent—from L. *in,* not; *con,* together; *sequor,* I follow: It. *inconsequente*]: not following from the premises. INCON'SEQUENCE, n. *-kwĕns* [F.]: want of logical sequence or just inference. INCON'SEQUEN'TIAL, a. *-kwĕn'shăl,* not regularly following from the premises; of little moment. INCON'SEQUEN'TIALLY, ad. *-lĭ.*

INCONSIDERABLE, a. *ĭn'kŏn-sĭd'ĕr-ă-bl* [*in*, not, and *considerable*]: not worthy of notice or consideration; unimportant; small; trivial. IN'CONSID'ERABLY, ad. *-blĭ*. IN'CONSID'ERABLENESS, n. *-bl-nĕs*.

INCONSIDERATE, a. *ĭn'kŏn-sĭd'ĕr-āt* [L. *inconsĭdĕrātus*, unconsidered, thoughtless—from *in*, not; *consīdĕrō*, I look at closely]: hasty; rash; thoughtless; not attending to circumstances. IN'CONSID'ERATELY, ad. *-lĭ*. IN'CONSID'ERATENESS, n. [F.—L.]: thoughtlessness; negligence; inattention.—SYN. of 'inconsiderate': inattentive; inadvertent; careless; hasty; heedless; negligent; imprudent; improvident; incautious; indiscreet; injudicious.

INCONSISTENT, a. *ĭn'kŏn-sĭs'tĕnt* [*in*, not, and *consistent*]: being contrary at different times; not suitable; contradictory. IN'CONSIS'TENTLY, ad. *-lĭ*. IN'CONSIS'TENCE, n. *-tĕns* [F. *inconsistance*], or IN'CONSIS'TENCY, n. *-tĕn-sĭ*, self-contradiction; want of uniformity; want of attention to circumstances or consequences.—SYN. of 'inconsistent': incongruous; irreconcilable; discordant; repugnant; incompatible.

INCONSOLABLE, a. *ĭn'kŏn-sō'lă-bl* [F. *inconsolable*—from L. *inconsōlābĭlĭs: in*, not, and Eng. *consolable*]: not to be consoled; grieved beyond measure. IN'CONSO'LABLY, ad. *-blĭ*.

INCONSONANT, a. *ĭn-kŏn'sō-nănt* [*in*, not, and *consonant*]: not agreeing; discordant. INCON'SONANTLY, ad. *-lĭ*. INCON'SONANCE, n. *-năns*, disagreement.

INCONSPICUOUS, a. *ĭn'kŏn-spĭk'ū-ŭs* [*in*, not, and *conspicuous*]: hardly discernible; not to be perceived by the sight. IN'CONSPIC'UOUSLY, ad. *-lĭ*.

INCONSTANT, a. *ĭn-kŏn'stănt* [F. *inconstant*—from mid. L. *inconstăn'tem: in*, not, and Eng. *constant*]: fickle; subject to sudden changes in opinions or purposes. INCON'STANCY, n. *-stăn-sĭ*, fickleness, as of temper or affection; unsteadiness. INCON'STANTLY, ad. *-lĭ*.—SYN. of 'inconstant': volatile; mutable; changeable; variable; versatile; unsteady; unstable; capricious.

INCONTESTABLE, a. *ĭn'kŏn-tĕs'tă-bl* [*in*, not, and *contestable:* F. *incontestable*]: too clear to be questioned; not admitting of dispute; undeniable. IN'CONTES'TABLY, ad. *-blĭ*.—SYN. of 'incontestable': indisputable; unquestionable; incontrovertible; irrefragable; indubitable.

INCONTINENT, a. *ĭn-kŏn'tĭ-nĕnt* [F. *incontinent*—from L. *incontĭnen'tem*, not retaining, immoderate: It. *incontinente: in*, not, and Eng. *continent*]: not restraining the passions; unchaste; unable to restrain natural discharges. INCON'TINENCE, n. *-nĕns* [F.—L.], or INCON'TINENCY, n. *-nĕn-sĭ*, want of restraint of the passions—especially of the sexual appetite; inability to restrain discharge. INCON'TINENTLY, ad. *-lĭ*.

INCONTROLLABLE, a. *ĭn'kŏn-trōl'lă-bl* [*in*, and *con-*

trollable]: not to be controlled; incapable of being restrained; uncontrollable.

INCONTROVERTIBLE, a. *ĭn-kŏn'trō-vĕr'tĭ-bl* [L. *in*, not, and *controvertible*]: too clear or certain to admit of dispute. INCON'TROVER'TIBLY, ad. *-blĭ*. INCON'TROVER'TIBIL'ITY, n. *-bĭl'ĭ-tĭ*.—SYN. of 'incontrovertible': see under INCONTESTABLE.

INCONVENIENCE, n. *ĭn'kŏn-vēn'yĕns*, or IN'CONVEN'IENCY, n. *-yĕn-sĭ* [F. *inconvenient*—from mid. L. *inconvĕnĭen'tem: in*, and Eng. *convenience*]: that which troubles or incommodes; anything that disturbs or impedes: V. to trouble; to cause uneasiness to. IN'CONVEN'IENCING, imp. IN'CONVEN'IENCED, pp. *-yĕnst*. IN'CONVEN'IENT, a. *-yĕnt*, incommodious; unsuitable; giving trouble or uneasiness to; unfit. IN'CONVEN'IENTLY, ad. *-lĭ*.—SYN. of 'inconvenience, n.': disturbance; annoyance; trouble; incommodiousness; disquiet; disadvantage; uneasiness; molestation; unfitness; unsuitableness; inexpedience.

INCONY, a. *ĭn-kō'nĭ* [probably from L. *in*, not; AS. *con*, to know: comp. Scot. and prov. Eng. *canny*, cautious, prudent, pretty, skilled in magic arts]: in *OE.*, pretty; innocent; artless; fine; delicate.

INCORPORATE, v. *ĭn-kŏr'pō-rāt* [*in*, into, and *corporate:* L. *in*, into; *corpŏrātŭs*, furnished with a body: F. *incorporer;* It. *incorporare*, to incorporate]: to work one mass or body into another; to unite; to blend; to form into a corporation or body politic; to unite so as to make part of another body; to embody: ADJ. mixed together; associated. INCOR'PORATING, imp. INCOR'PORATED, pp.: ADJ. associated; united in a legal body. INCOR'PORA'TION, n. *-shŭn* [F.—L.]: union of different ingredients into one mass; an association constituted by the legislature; formerly in Britain, by grant of the crown. See CORPORATION.

INCORPOREAL, a. *ĭn'kŏr-pō'rĕ-ăl* [*in*, not, and *corporeal*]: not consisting of matter; immaterial; spiritual. IN'CORPO'REALLY, ad. *-lĭ*. IN'CORPO'REALISM, n. *-ĭzm*, state of spiritual existence. INCOR'PORE'ITY, n. *-rē'ĭ-tĭ*, the quality of being not material.—SYN. of 'incorporeal': unsubstantial; bodiless; unbodied.

INCORRECT, a. *ĭn'kŏr-rĕkt'* [F. *incorrect*, incorrect—from L. *incorrectus: in*, not, and Eng. *correct*]: not exact; not according to a copy or model; not according to truth; in *OE.*, not duly regulated or placed under proper obedience. IN'CORRECT'LY, ad. *-lĭ*, not exactly; inaccurately. IN'CORRECT'NESS, n. *-rĕkt'nĕs*, want of exactness; inaccuracy.—SYN. of 'incorrect': erroneous; wrong; faulty; inaccurate; inexact.

INCORRIGIBLE, a. *ĭn-kŏr'rĭ-jĭ-bl* [F. *incorrigible*—from mid. L. *incorrĭgĭb'ĭlĭs: in*, not, and Eng. *corrigible*]: that cannot be amended; bad beyond correction or reform. INCOR'RIGIBLY, ad. *-blĭ*. INCOR'RIGIBLENESS, n. *-bl-nĕs*, or INCOR'RIGIBIL'ITY, n. *-bĭl'ĭ-tĭ* [F. *incorrigi-*

bilité]: the quality of being depraved or bad beyond correction; hopeless depravity in persons.

INCORRODIBLE, a. *ĭn'kŏr-rō'dĭ-bl* [*in*, not, and *corrodible*]: that cannot be eaten away or impaired. IN'CORRO'DIBLY, ad. *-blĭ*.

INCORRUPT, a. *ĭn'kŏr-rŭpt*, or IN'CORRUP'TED, a. [L. *incorruptus*, uncorrupted: *in*, not, and Eng. *corrupt*]: not impaired or spoiled; untainted; pure; sound. IN'CORRUP'TIBLE, a. *-tĭ-bl* [F.—L.]: not corruptible; that cannot decay; incapable of being bribed; strictly just. IN'CORRUP'TIBLY, ad. *-blĭ*. IN'CORRUP'TIBLENESS, n. *-bl-nĕs*, or IN'CORRUP'TIBIL'ITY, n. *-bĭl'ĭ-tĭ* [F. *incorruptibilité*]: the quality of being incapable of corruption or decay. IN'CORRUP'TION, n. *-rŭp'shŭn*, exemption from corruption or decay. IN'CORRUP'TIVE, a. *-tĭv*, free from corruption or decay.

INCRASSATE, v. *ĭn-krăs'sāt* [mid. L. *incrassātus*, flattened, made thick—from L. *in*, into; *crassus*, thick, dense: F. *incrasser*, to thicken]: to thicken; to become thick or thicker: ADJ. in *bot.*, thickened. INCRAS'SATING, imp. INCRAS'SATED, pp. IN'CRASSA'TION, n. *-sā'shŭn* [F.—L.]: the act of thickening; the state of becoming thick. INCRAS'SATIVE, a. *-sā-tĭv*, having the quality of thickening.

INCREASE, n. *ĭn'krēs* [Norm. F. *encrescr*, to increase: L. *incres'cĕrĕ*, to grow or increase in anything, to swell—from *in*, into; *cresco*, I grow]: growth; enlargement; addition to the original stock; accession; produce: V. *ĭn-krēs'*, to make or become more or greater; to advance or exalt; to extend; to spread; to make worse; to augment; to grow. INCREAS'ING, imp. INCREASED, pp. *-krēst:* ADJ. multiplied; made more or greater, as in number, bulk, value, etc. INCREAS'INGLY, ad. *-lĭ*.—SYN. of 'increase, v.': to multiply; advance; swell; intensify; add to; exalt;—of 'increase, n.': augmentation; increment; generation; progeny.

INCREDIBLE, a. *ĭn-krĕd'ĭ-bl* [F. *incrédible*—from L. *incrēdĭb'ĭlĭs*, that cannot be believed—from *in*, not; *crēdo*, I believe: It. *incredibile*]: that cannot be believed; too improbable to admit of belief. INCRED'IBLY, ad. *-blĭ*. INCRED'IBIL'ITY, n. *-bĭl'ĭ-tĭ* [F. *incrédibilité*], or INCRED'IBLENESS, n. *-bl-nĕs*, the quality of being too extraordinary to admit of belief.

INCREDULOUS, a. *ĭn-krĕd'ū-lŭs* [L. *incrēdŭlus*, unbelieving: F. *incrédule*, incredulous]: not believing; indisposed to receive as true. INCRED'ULOUSNESS, n. *-nĕs*, or INCREDULITY, n. *ĭn'krĕ-dū'lĭ-tĭ* [F. *incrédulité*]: a refusal of belief; indisposition to believe.—SYN. of 'incredulity': skepticism; unbelief; disbelief.

INCREMATE, v. *ĭn'krē-māt* [L. *incrĕmātus*, consumed by burning—from *in*, into; *crĕmō*, I burn]: to burn a dead body instead of interring it. IN'CREMATING, imp. IN'CREMATED, pp. *-mā-tĕd*. INCREMATION, n. *ĭn'krē-mā'-*

shŭn, the burning of dead bodies instead of interring them.

INCREMENT, n. *ĭn'krĕ-mĕnt* [L. *incrēmen'tum,* an increase, growth—from *in,* into; *crescō,* I grow]: the act of becoming greater; increase; that which is added; produce; in *math.,* the quantity which increases a variable quantity. INCRESCENT, a. *ĭn-krĕs'ĕnt,* growing; augmenting; swelling.

INCRIMINATE, v. *ĭn-krĭm'ĭ-nāt* [L. *in,* in; *crimĭnātus,* accused of crime]: to charge with a crime or fault; to accuse. INCRIM'INATING, imp. INCRIM'INATED, pp. INCRIM'INA'TION, n. *-nā'shŭn* [F.—L.]: the act of charging with crime.

INCRUST, v. *ĭn-krŭst'* [F. *incruster*—from L. *incrustārĕ,* to cover, as with a crust—from *in,* in or on; *crusto,* I plaster: It. *incrustare*]: to cover with a hard coat or crust; to form a crust on the surface of. INCRUST'ING, imp. INCRUST'ED, pp.: ADJ. covered with a crust. IN'CRUSTA'TION, n. *-tā'shŭn* [F.—L.]: the crust or rough coat formed on the surface of a body, as the coatings of carbonate and sulphate of lime and other solids formed on the internal portions of engine boilers by deposition from the feed water; a covering or inlaying of marble, mosaic, etc; also INCRUST'MENT, n. *-krŭst'-mĕnt.*

INCUBATE, v. *ĭn'kū-bāt* [L. *incŭbātus,* lain or rested upon—*in,* in or on; *cŭbo,* I lie down]: to sit upon, as upon eggs for hatching. IN'CUBATING, imp. IN'CUBATED, pp. IN'CUBA'TION, n. *-bā'shŭn* [F.—L.]: the act of sitting on eggs for the hatching of young; in *med.,* the period during which a contagious or infectious disease lies latent before showing itself. IN'CUBATIVE, a. *-tĭv,* formed by or having the nature of incubation. IN'CUBA'TOR, n. *-tĕr,* apparatus for hatching eggs by artificial heat.—See INCUBATION, THE PERIOD OF.

INCUBA'TION, THE PERIOD OF: the time in which birds sit on their eggs before the young are hatched; varying in different species, but nearly constant in each. In the humming-birds, smallest animals of this class, it is only 12 days; in canaries, 15 to 18 days; in the common fowl, 21 days; in the duck, it is 28 to 30 days; in the guinea-fowl, 28 or 29 days; in the turkey, 30 days; in the swan, 40 to 45 days. A certain degree of heat (about 104°) is necessary for the development of the young bird; that of the sun is sufficient, during the day, to hatch the eggs of some birds (e.g., the ostrich) inhabiting tropical countries; but in general the mother keeps up a suitable temperature by placing the eggs in a warm and carefully constructed nest (q.v.), and by covering them with her own body. In some cases, the male bird takes part in this duty; usually, however, his services are restricted to providing his mate with food.

Eggs may, however, be hatched without the aid of the

parent bird. From time immemorial, the Egyptians have hatched eggs by artificial warmth in peculiar but comparatively simple stoves for the purpose. Thirty millions of chickens are annually hatched by means of the egg-ovens in Egypt. In 1777, Bonnemain devised a hatching apparatus, which supplied the Parisian markets with poultry. In 1825, D'Arcet obtained chickens from artificial incubation by means of the thermal waters at Vichy. The *Eccaleobion* (q.v.), invented by Bucknell, was said to possess a perfect control over temperature from 300° Fahrenheit to that of cold water for any length of time. In artificial incubation, the lines that separate success from failure are easily overstepped. Of the most modern incubators, almost all have attained great perfection in regulating the temperature inside the very narrow range within which practical success is attainable, as well as in overcoming difficulties as to dampness or dryness of the atmosphere, and as to exposing the upper and under surface of the egg to slightly different temperatures. The main features of incubators usually agree—a water-tank, heated by some kind of lamp, with a tray or drawer for eggs, and a small water-tray for damping the air. The most fatal defect in an incubator is that of permitting an injurious rise of temperature. The process is used mainly for hen's eggs, but is not confined to them. See OSTRICH-FARMING.

INCUBUS, n. *ĭn'kū-bŭs* [mid. L. *incŭbŭs,* a nightmare —from L. *incŭbārĕ,* to lie upon—from *in,* upon; *cŭbō,* I lie down; It. *incubo;* F. *incube,* nightmare]: the nightmare; that which sits upon, as some hideous monster; any oppressive or stupefying influence.

INCULCATE, v. *ĭn-kŭl'kāt* [L. *inculcātus,* pressed or forced into, crammed in—from *in,* into; *calcārĕ,* to tread: It. *inculcare—lit.,* to tread into with the heel]: to impress or enforce by frequent admonitions; to teach by frequent repetitions. INCUL'CATING, imp. INCUL'CATED, pp. INCUL'CATOR, n. *-kā-tėr,* one who. IN'CULCA'TION, n. *-kā'shŭn,* the act of impressing on the mind by frequent repetitions.

INCULPATE, v. *ĭn-kŭl'pāt* [mid. L. *inculpātŭs,* brought blame upon—from L. *in,* into; *culpātŭs,* reproached, blamed—from *culpa,* a fault; F. *inculper*]: to bring into blame; to censure; opposed to *exculpate.* INCUL'PATING, imp. INCUL'PATED, pp. IN'CULPA'TION, n. *-pā'shŭn* [F.—L.]: blame; censure. INCUL'PATORY, a. *-pă'tėr-ĭ,* imputing blame; criminatory.

INCUMBENT, a. *ĭn-kŭm'bĕnt* [L. *incumbens,* or *incumben'tem,* leaning or lying upon—from *in; cubo* or *cumbo,* I lie down]: lying or resting on, as a duty or obligation; indispensable; in *bot.,* applied to cotyledons with the radicle on their back: n. the person who is in the possession of an office, e.g. the rector, parson, or vicar holding an ecclesiastical benefice in England. In

Scotland the term is so applied only popularly. INCUM'BENTLY, ad. *-lĭ.* INCUM'BENCY, n. *-bĕn-sĭ,* the state of holding or being in possession of an ecclesiastical office.

INCUMBER, etc. See ENCUMBER.

INCUM'BERED ESTATES COURTS: special tribunal (1849-59) for facilitating sale of landed property in Ireland subject to incumbrances; superseded 1859 by the Landed Estates court, after making 3,457 sales, producing £25,190,839.

INCUM'BRANCES, or ENCUM'BRANCES: general term for burdens or charges on land. See MORTGAGE; LIEN.

INCUNABULA, n. plu. *ĭn'kū-nā'bū-lă* [L. *incūnābŭlă,* swathing-bands, a birth-place—from *in,* into; *cūnābŭlă,* a cradle]: books printed in the early period of the art; the books which, as Peignot has it, *touchent au berceau de l'imprimerie.* The term is usually restricted to those which appeared before 1500, by which time the art was completely formed in all its principal departments. The number of these works is probably not far short of 20,000. Hain, it is true, in his *Repertorium Bibliographicum,* enumerates only 16,299; but his death left his work incomplete, especially the last volume.—Incunabula, with hardly any exceptions, belong to the category of rare books, and are much sought by collectors; but besides their interests as literary curiosities, many, e.g., the first editions (*editiones principes*) of the Greek and Roman classics, are intrinsically valuable in a critical view; while others are important, as marking the successive steps of advancement in the art of printing. See PRINTING.

The principal works treating specially of incunabula are—Panzer, *Annales Typographici, ab Artis Inventæ Origine ad Annum M.D.* (continued, however, to 1536); 11 vols. 4to, Norimbergæ, 1793-1803; Maittaire, *Annales Typographici, ab Artis Inventæ Origine ad Annum* 1557 (*cum Appendice ad Ann.* 1664), 3 tom. in 5 vols. 4to, Hagæ-Comit. 1719-25; Serna Santander, *Dictionnaire Bibliographique Choisi du XVe Siècle,* 3 tom. 8vo, Bruxelles 1805-7; and Hain, *Repertorium Bibliographicum, quo Libri omnes ab Arte Inventa usque ad M.D. Typis Expressi recensentur,* 4 tom. 8vo, Stutgartiæ 1828-38. The last is the best work on the subject. Much valuable information is also in Bernard, *De l'Origine et des Débuts de l'Imprimerie en Europe* (1853); and, on French Incunabula, in Brunet's *La France Littéraire au XVe Siècle* (1865).

INCUR, v. *ĭn-kĕr'* [L. *incur'rĕrĕ,* to run or rush into—from *in,* into; *curro,* I run]: to become liable or subject to, to contract, as a debt. INCUR'RING, imp. INCURRED', pp. *-kĕrd'.*

INCURABLE, a. *ĭn-kū'ră-bl* [F. *incurable*—from mid. L. *incūrābĭlĭs: in,* not, and Eng. *curable:* It. *incurabile*]: that cannot be cured; incapable of remedy or cure; ir-

remediable: n. one beyond the reach of cure. INCU'RABLY, ad. *-blĭ.* INCU'RABLENESS, n. *-bl-nĕs,* or INCU'RABIL'ITY, n. *-bĭl'ĭ-tĭ* [F. *incurabilité*]: a state not admitting of any cure; impossibility of cure.—SYN. of 'incurable, a.': remediless; irretrievable; irrecoverable; hopeless.

INCURIOUS, a. *ĭn-kū'rĭ-ŭs* [L. *incūrĭōsŭs*—from *in,* not; *curiōsus,* inquisitive: F. *incurieux*]: not curious or inquisitive; inattentive. INCU'RIOUSLY, ad. *-lĭ.* INCU'RIOUSNESS, *-nĕs,* or INCU'RIOS'ITY, n. *-ŏs'ĭ-tĭ,* want of curiosity; inattentiveness.

INCURSION, n. *ĭn-kėr'shŭn* [F. *incursion*—from L. *incursĭōnem,* a running against, an onset—from *in,* into; *cursus,* a running: It. *incursione*]: a sudden inroad or invasion for plunder or attack; a predatory inroad without occupation. INCUR'SIVE, a. *-sĭv,* pertaining to an incursion; hostile.—SYN. of 'incursion': inroad; invasion; foray; raid; irruption; intrusion; attack; ravaging.

INCURVATE, v. *ĭn-kėr'vāt* [L. *incurvātus,* bent into a curve—from *in,* into; *curvus,* bent, crooked]: to bend; to crook: ADJ. curved inward or upward. INCUR'VATING, imp. INCUR'VATED, pp.: ADJ. gradually bending from without inward. IN'CURVA'TION, n. *-vā'shŭn,* state of being bent; act of bowing or bending. INCURVE, v. *ĭn-kėrv',* to curve; to curve in or inwardly; to become bent. INCUR'VING, imp. INCURVED', pp. *-kėrvd'.* INCUR'VITY, n. *-kėr'vĭ-tĭ,* crookedness.

INCUS, n. *ĭn'kŭs* [L. *incus,* a smith's anvil]: a small bone of the ear, so-called from its supposed resemblance to an anvil.

INCUSE, a. *ĭn-kūz'* [L. *incussus,* struck or dashed against]: formed by stamping; stamped: v. to form by stamping. INCU'SING, imp. INCUSED, pp. *ĭn-kūzd'.*

INDEBI'TATUS ASSUMP'SIT: name often given to an action for debt in England.

INDEBTED, a. *ĭn-dĕt'ĕd* [OF. *endetter* and *endebter,* to bring into debt—from *en,* in, into; *dette* and *debte,* a debt—from L. *in,* into; *dēbĭtus,* owed]: being in debt, obliged by something received. INDEBT'EDNESS, n. *-nĕs,* state of being indebted.

INDECENCY, n. *ĭn-dē'sĕn-sĭ* [*in,* not, and *decency;* L. *indĕcens,* or *indĕcen'tem,* unseemly; indecent: It. *indecento:* F. *indécent*]: that which is unbecoming in language or manners; an offense against delicacy. INDE'CENT, a. *-sĕnt,* unfit to be seen or heard; offensive to modesty. INDE'CENTLY, ad. *-lĭ.* INDECENT EXPOSURE, criminal offense by common law and by statute, if committed in any public place. To sell or expose an obscene book, print, or picture, also is criminal; and a search-warrant may be obtained to search premises and seize and destroy such articles.—SYN. of 'indecent': immodest; indelicate; indecorous; impure; obscene; unbecoming; unseemly; gross; unchaste; shameful; filthy.

INDECIDUATA, n. *ĭn-dē-sĭd-ū-ā'ta* [mod. L., prefix *in*, not; *deciduatus*—from *deciduus*, that which is cut or lopped off]: in *zool.*, a primary division of *Placental Mammalia*, named by Prof. Huxley from their having the placenta non-deciduous. It contains the orders *Ungulata* and *Cetacea*.

INDECISION, n. *ĭn'dĕ-sĭzh'ŭn* [F. *indécision*—from L. *indecīsiōnem: in*, not, and Eng. *decision*]: want of settled purpose or of firmness; a wavering of mind; irresolution. IN'DECI'SIVE, a. *-sī'sĭv*, unsettled; wavering; not bringing to a final close or issue. IN'DECI'SIVELY, ad. *-lĭ*. IN'DECI'SIVENESS, n. *-nĕs*, state of being undecided.

INDECLINABLE, a. *ĭn'dĕ-klī'nă-bl* [F. *indéclinable*—from mid. L. *indĕclīnab'ĭlĭs: in*, not, and Eng. *declinable*]: that cannot be varied by terminations.

INDECOMPOSABLE, a. *ĭn-dē'kŏm-pō'ză-bl* [F. *indécomposable: in*, not, and Eng. *decomposable*]: that cannot be decomposed or resolved into its constituent parts.

INDECOROUS, a. *ĭn'dĕ-kō'rŭs* [L. *indĕcōrŭs*, unseemly, unbecoming: *in*, not, and Eng. *decorous*]: unbecoming; violating good manners. IN'DECO'ROUSLY, ad. *-lĭ*. IN'DECO'ROUSNESS, n. *-nĕs*. IN'DECO'RUM, n. *-rŭm* [L.]: impropriety of behavior; that in manners or behavior which violates the rules of good breeding or civility.—SYN. of 'indecorous': indecent; rude; coarse; unseemly; uncivil; impolite.

INDEED, ad. int. *ĭn-dēd'* [*in*, in or on, and *deed*]: in reality; in fact; in truth.

INDEFATIGABLE, a. *ĭn'dĕ-făt'ĭ-gă-bl* [F. *indéfatigable*—from L. *indefătĭgābĭlĭs*, that cannot be wearied out—from *in*, not; *defătīgō*, I weary]: unwearied; not yielding to fatigue. IN'DEFAT'IGABLY, ad. *-blĭ*. IN'DEFAT'IGABLENESS, n. *-bl-nĕs*, or IN'DEFAT'IGABIL'ITY, n. *-bĭl'ĭ-tĭ*, incapability of being fatigued.—SYN. of 'indefatigable': persevering; assiduous; untiring; unfatigued.

INDEFEASIBLE, a. *ĭn'dĕ-fē'zĭ-bl* [*in*, not, and *defeasible*]: not to be defeated; that cannot be made void. IN'DEFEA'SIBLY, ad. *-blĭ*. IN'DEFEA'SIBIL'ITY, n. *-bĭl'ĭ-tĭ*, the quality or state of not being subject to be made void.

INDEFENSIBLE, a. *ĭn'dĕ-fĕn'sĭ-bl* [*in*, not, and *defensible*]: that cannot be defended; not to be vindicated or justified. IN'DEFEN'SIBLY, ad. *-blĭ*. IN'DEFEN'SIBIL'ITY, n. *-bĭl'ĭ-tĭ*.

INDEFINABLE, a. *ĭn'dĕ-fī'nă-bl* [*in*, not, and *definable*]: that cannot be defined. IN'DEFI'NABLY, ad. *-blĭ*.

INDEFINITE, a. *ĭn-dĕf'ĭ-nĭt* [*in*, not, and *definite:* L. *indēfinītus*, indefinite]: not limited; not precise or certain; not distinctly marked; vague or unsettled; in *bot.*, applied to inflorescence in which the central or terminal flower is the last to expand; having more than twenty stamens; very numerous, as ovules or seeds. INDEF'INITE-

LY, ad. *-lĭ.* INDEF'INITENESS, n. *-nĕs,* the quality of being unlimited or uncertain.

INDEHISCENT, a. *ĭn'dĕ-hĭs'sĕnt* [L. *in,* not; *dehiscen'tem,* gaping—from *dehis'co,* I gape]: in *bot.,* not opening—applied to fruits, as the apple, which do not split open.

INDELIBLE, a. *ĭn-dĕl'ĭ-bl* [F. *indélébile*—from L. *indelĕbĭlĭs,* imperishable—from *in,* not; *dēlĕō,* I blot out: It. *indelebile*]: that cannot be blotted out; that cannot be effaced, cancelled, or removed. INDEL'IBLY, ad. *-blĭ.* INDEL'IBIL'ITY, n. *-bĭl'ĭ-tĭ,* quality of being indelible.

INDELICATE, a. *ĭn-dĕl'ĭ-kāt* [*in,* not, and *delicate:* F. *indélicat*]: offensive to good manners or purity of mind; coarse; indecorous. INDELICACY, n. *ĭn-dĕl'ĭ-kă-sĭ,* want of delicacy; that which is offensive to refined taste or purity of mind; a certain coarseness of manners or language. INDEL'ICATELY, ad. *-kāt-lĭ.*—SYN. of 'indelicate': unseemly; unbecoming; gross; rude; indecent; impolite; broad; offensive.

INDEMNIFY, v. *ĭn-dĕm'nĭ-fī* [L. *in,* against; *damnum,* loss; *făcĭō,* I make: F. *indemne,* indemnified, unhurt—from L. *indemnis,* uninjured]: to secure against loss, damage, or punishment; to make good what has been lost; to compensate. INDEM'NIFYING, imp. INDEM'NIFIED, pp. *-nĭ-fīd.* INDEM'NIFICA'TION, n. *-fĭ-kā'shŭn,* the act of indemnifying; security against loss or damage; the payment made on account of such loss. INDEM'NITY, n. *-nĭ-tĭ* [F. *indemnité*—from mid. L. *indemnĭtātem*]: a security or pledge by which a person is secured against loss or punishment; compensation. INDEMNITY-DEED, in *law,* deed given by way of security; the usual form is by giving a bond of indemnity which operates if the engagement is not fulfilled, but otherwise becomes void. ACT OF INDEMNITY, an act of parliament to relieve a government or its agents from the consequences of illegal acts which urgent circumstances may, in their opinion, have rendered necessary.

INDEMONSTRABLE, a. *ĭn'dĕ-mŏn'stră-bl* [*in,* not, and *demonstrable:* mid. L. *indemonstrābĭlĭs*]: that cannot be demonstrated; not evident.

INDENT, v. *ĭn-dĕnt'* [mid. L. *indentātus,* having a toothed or serrated edge or border—from L. *in,* into; F. *dent,* a tooth—from L. *dentem,* a tooth]: to notch; to cut into inequalities, like a row of teeth; to make a compact; to contract; to bargain; to order; in *OE.,* to run in and out; to zigzag: N. a stamp; an inequality; an incision; a contract; an order, as for goods. INDENT'ING, imp. INDENT'ED, pp.: ADJ. notched, like the teeth of a saw; undulated: sinuous: in *her.,* applied to one of the partition lines of the shield, notched similarly to dancette (q.v.), but with the notches much smaller and not limited in number. IN'DENTA'TION, n. *-tā'shŭn,* a notch or jag; a cut or depression in any margin or border. IN-

DENTION, in *printing*, the beginning of the first line of a paragraph farther in than the other lines—called *common indention;* the beginning of the second and succeeding lines farther in than the first line is called *hanging* or *reverse indention.* INDENTURE, n. *ĭn-dĕn'tūr* [mid. L. *indentūrā*, a paper with a notched edge corresponding to the notched edge of another separated part]: written covenant or contract, e.g. of apprenticeship—originally required to be one of two copies made on the same skin or parchment, which were then separated by a zigzag cutting, so as to correspond when put together again: this is no longer requisite: V. to bind by a written contract or indenture; in *OE.*, to run in and out like a jagged surface; to wrinkle. INDEN'TURING, imp. INDEN'TURED, pp. *-tūrd.*—SYN. of 'indentation': impression; print; mark; stamp; depression.

INDENT'ED HEAD: peninsula in the colony of Victoria, w. boundary of the entrance of Port Phillip.

INDEPEN'DENCE, DECLARA'TION OF. See DECLARATION OF INDEPENDENCE.

INDEPENDENT, a. *ĭn'dĕ-pĕn'dĕnt* [*in*, not, and *dependent:* It. *independente:* F. *indépendant*]: not subordinate; not holding or enjoying at the will of another; self-relying or self-directing; not connected with; possessing moderate wealth. IN'DEPEN'DENCE, n. *-dĕns*, or IN'DEPEN'DENCY, n. *-dĕn-sĭ*, sufficient means to support one's self; state over which none has power; exemption from undue influence; in *bot.*, the separation of organs usually entire. IN'DEPEN'DENTLY, ad. *-lĭ.* INDEPENDENCE DAY, in the *United States*, the fourth day of July, anniversary of the adoption of the Declaration of Independence (q.v.). INDEPENDENT STATES, states recognized in international law as self-governing in their internal affairs, and as dealing with all other states on terms of equal sovereignty. The states of the American Union are not thus independent—being self-governed not absolutely and universally, but only in a certain range of civil functions; also not exercising sovereignty in international relations.

INDEPEN'DENTS: name formerly given in Britain to adherents of the church-order, now known as CONGREGATIONALISM (q.v.).

INDERAB. See ANDERAB.

INDESCRIBABLE, a. *ĭn'dĕ-skrī'bă-bl* [*in*, not, and *describable*]: that cannot be described.

INDESTRUCTIBLE, a. *ĭn'dĕ-strŭk'tĭ-bl* [*in*, not, and *destructible:* F. *indestructible*]: that cannot be destroyed; imperishable. IN'DESTRUC'TIBLY, ad. *-blĭ.* IN'DESTRUC'TIBIL'ITY, n. *-bĭl'ĭ-tĭ*, quality of being incapable of destruction.

INDETERMINABLE, a. *ĭn'dĕ-tĕr'mĭn-ă-bl* [*in*, not, and *determinable:* F. *indéterminé*, undetermined—from

L. *indētermĭnātus*]: that cannot be determined, ascertained, or settled. IN'DETER'MINABLY, ad. *-blĭ*. IN'DETER'MINATE, a. *-mĭn-āt* [mid. L. *indētermĭnātus*, undefined—from *in*, not; *determĭnātus*, defined, limited]: variable; indefinite; uncertain; in *math.*, applied to problems which admit an unlimited number of solutions, and to algebraic expressions which reduce to the forms 0/0, etc.; in *bot.*, applied to indefinite inflorescence. IN'DETER'MINATELY, ad. *-lĭ*. IN'DETER'MINA'TION, n. *-ā'shŭn* [F.—L.]: want of determination; irresolution. IN'DETER'MINED, a. *-mĭnd*, unsettled; unfixed.

INDETERMINATE PROBLEMS: in Mathematics, problems admitting an unlimited number of solutions. Thus a set of unknown quantities connected by equations is fully determined by the equations only if the number of the latter is equal to the number of unknowns. For example, a single equation, like $2x + 3y = 5$, between the two unknowns x and y is satisfied by an infinite number of pairs of values of x and y, while two such equations would have only one solution. The solution of any problem requires a certain number of data; if only part of these are available, the problem is indeterminate. But in such cases a general formula can be obtained which covers all the possible solutions. An interesting chapter is furnished by the theory of integral solutions (see DIOPHANTINE ANALYSIS). Thus the equation $2x + 3y = 5$ has the integral solution $x = 1$, $y = 1$, and this is the only solution in positive integers. But if negative integers are admitted, the general solution is $x = 1 - 3t$, $y = 1 + 2t$, where t is any integer.

Another form of indeterminacy often arises in Algebra, where the solution may be perfectly definite but its algebraic expression may come out in indeterminate form, such as 0/0. Thus, if in the fraction $(x^2 - 3x + 2)/(x^2 - 4x + 3)$ we put $x = 1$, the result is 0/0. But if we divide numerator and denominator by $x - 1$, the fraction becomes $(x - 2)/(x - 3)$, which when $x = 1$ becomes $\frac{1}{2}$. This is the value which the original fraction approaches as x approaches 1; it is called the limiting value of the fraction as x approaches 1. Often, however, there is no one limiting value. Thus the fraction $xy/(x^2 + y^2)$ can be made to approach any value whatever as x and y both approach 0. For example if y is kept equal to x, the limiting value is $\frac{1}{2}$, while if y is kept equal to $2x$ the limiting value is $\frac{2}{5}$. This is a case of real indeterminacy.

INDETERMINISM: a theory the opposite of DETERMINISM, which see. In general it maintains that mental facts cannot be fully accounted for by previous external or mental conditions. It is in one of its forms commonly known as the doctrine of the freedom of the will.

INDEX, n. *ĭn'dĕks*, INDEXES, n. plu. *ĭn'dĕks-ĕz*, or INDICES, n. plu. *ĭn'dĭ-sēz* [L. *index*, a discoverer, the fore-

finger; *indĭcō*, I point out, I show]: the forefinger, being that employed in pointing at an object; that which points out; a table of references; in *alg.*, the exponent indicating the power of a quantity: V. to provide with or form a table of references to, as to a book. IN'DEXING, imp. IN'DEXED, pp. *-dĕkst*, provided with an index. INDEX'ICAL, a. *-ĭ-kăl*, pertaining to; having the form of an index. INDEX'ICALLY, ad. INDEX EXPURGATORIUS, *-ĕks-pĕr'gă-tōr'ĭ-ŭs* [L. *expurgatus*, purged quite, cleansed]: a list of passages of books which are to be expunged or altered. INDEX-HANDS, the pointers of a clock, or a watch.

IN'DEX (more fully INDEX LIBRORUM PROHIBITORUM): catalogue, published by papal authority in the Rom. Cath. Church, of books, the reading of which is prohibited to members of that church, whether on doctrinal, moral, or religious grounds. As a natural consequence of the claim of the Rom. Cath. Church to authority in matters of religion, and to infallibility, that church also claims the right or the duty of watching over the faith of its members, and of guarding it against every danger of corruption, chief among which is held to be the circulation of books believed to be injurious to faith or to morality. The earliest recorded exercise of this restrictive authority is the prohibition of the writings of Arius; and a council of Carthage, 398, issued, even for bishops, a similar prohibition of Gentile books, though it permitted to them the reading of the works of heretics. The earliest example of a prohibitory catalogue is in the decree of a council at Rome (494) under Pope Gelasius (*Labbe Conc.*, ii. col. 938-941), which, having enumerated the canonical books of Scripture, and other approved works, recites also the apocryphal books; together with a long list of heretical authors, whose writings it prohibits, and orders to be eliminated from the churches. The mediæval popes and councils pursued the same course as to the heterodox or dangerous writings of their respective periods, and the multiplication of such books after the invention of printing led to a more stringent as well as more systematic procedure. The university press of Louvain issued, 1546, again 1550, a catalogue of prohibited books. Similar lists appeared by authority at Venice, Paris, and Cologne; and Pius IV. issued, 1557 and 59, what may be regarded as properly the first Roman Index. One of the gravest undertakings of the Council of Trent was a more complete and authoritative enumeration of all those books the use of which it was expedient to prohibit to the faithful. A committee was appointed for the purpose, and had made great progress in the work; but it was found impossible to bring the examination of the books to an end before the close of the council; and all the papers of the committee were handed over by the council to the pope, with instructions that the work should be completed, and the result

published by his own authority, which was accordingly done by Pius IV. 1564. Further additions and certain modifications of its rules were made by Sixtus V. and Clement VII. It was republished 1595, and with the addition of such books as from time to time it was deemed expedient to prohibit, in several subsequent editions, the most remarkable of which are those of Brasichelli (Rome 1607); Quiroga, *Index Librorum Expurgandorum* (Salamanca 1601); and Sotomayor, *Novissimus Index* (Madrid 1648). The edition best known to modern theological readers is that of Rome 1819. In the intervals between the editions, the decrees by which further additions to the Index are made, are made public at Rome, and circulated in the various countries.

The prohibitions of the Roman Index are of two classes, either absolute and total, or partial and provisional 'until the book shall have been corrected.' The edition of Quiroga, mentioned above, regards the latter. The ground of the prohibition may be either the authorship of the work, or its subject, or both together. Under the first head are prohibited all writings of *heresiarchs*—i.e., the first founders of heresies—no matter what may be the subject. Under the second head are prohibited all books confessedly immoral, and all books on magic, necromancy, etc. Under the third are prohibited all books of heretical authorship treating on doctrinal subjects; all versions of the Bible by heretical authors; and all books, no matter by whom written, which contain statements, doctrines, or insinuations prejudicial to the Rom. Cath. religion. The preparation of the Index, in the first instance, was committed to the care of the Congregation of the Inquisition in Rome; but a special Congregation of the Index was established by Pius V., and more fully organized by Sixtus V. This congregation consists of a prefect (who is always a cardinal) of cardinals, of consulters, and of examiners of books (*qualificatores*). Its proceedings are governed by rules which have been authoritatively laid down by several popes, especially by Benedict XIV., in a constitution issued 1753, July 10, to which the reader is referred for the best and most authentic exposition of a subject on which much misconception exists on the part of Rom. Catholics as well as of Protestants.

The growth of modern literature has of course entirely outstripped the limited and tardy machinery of this tribunal. A very small proportion, even of publications most opposed to the Roman Church, outside of Italy, find their way by name to the Roman Index; but besides the positive prohibitions of the Index itself, there are certain general rules regarding the use of books by which the freedom of what is considered perilous or pernicious reading is much limited among members of that communion. Such rules, however, cannot be practically brought into operation in those countries where the Rom.

Cath. and Prot. literatures are so interwoven that it is impossible to separate them even in the ordinary intercourse of life. See Wetzer's *Kirchen-Lexicon*, art. 'Index.'

Few parts of the Rom. Cath. system are more repugnant to Protestants than the institution of the 'Index,' as it strikes at the root of the fundamental principle of Protestantism itself—namely, that of private judgment. And this theoretical repugnance is increased by seeing that, in its practical working, such names as Gibbon, Robertson, Guicciardini, Sismondi, Hallam, Goldsmith (*History of England*), Descartes, Locke, Kant (*Essay on Pure Reason*), J. S. Mill (*Political Economy*), Whately (*Logic*), Bacon, Milton, Addison, Dante (*De Monarchia*), etc., are put under the ban.

INDIA, *ĭn'dĭ-a* [name borrowed by the Greeks from the Persians, who, however, applied the name of Hindus at first only to the dwellers on the banks of the river *Sindhu* (Skr. for Indus): from this, by the regular change of *s* into *h*, the Persian *Hind* is derived. Hindustán (the country of the Hindus) is a modern word applied by the Persians to the whole of India; but Europeans understand it as applying properly to that portion of it n. of the Vindhya Mountains]: extensive region of Asia, celebrated during many ages for its riches and valuable natural productions, its beautiful manufactures and costly merchandise, the magnificence of its sovereigns, and the early civilization of its people. Its recent history has an interesting connection with the history of England.

Hither India is the central peninsula of s. Asia; 8° 4′—35° n. lat. and 67°—92° e. long. According to these limits, its length is approximately 1,900 m.; its breadth, along the parallel of 25° n. lat., 1,600 m.; about 1,300,000 sq. m. The natural boundaries of the vast region are, on the n., the range of the Himalaya Mountains, which separates it from Tartary, China, and Tibet; on the w., the Suliman Mountains divide it from Afghanistan and Beloochistan; on the s., the Arabian Sea and the Gulf of Bengal; on the e., the hill-ranges which separate Chittagong and Assam from Burmah. From the mouths of the Brahmaputra and the Indus, the e. and w. coasts, inclining toward the same point, meet at Cape Comorin, and thus give to southern India the form of an irregular triangle. The two sides of the triangle have each a coast-line of about 2,000 m. India is, in fact, from its great extent of seaboard, essentially a maritime country.

Further India is the name given to the s.e. peninsula of Asia. It is not treated of in this article: for information concerning it, see SIAM; BURMAH; COCHIN-CHINA; etc.

Physical Features.—Hither India presents a most diversified surface and varied scenery; it has indeed been

INDIA AND SIAM.
SCALE OF STATUTE MILES.
0 50 100 200 300 400
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R., McN. & Co. Engr's Chi.
Longitude East from Greenwich.
70°
80°
90°
100°
10°
20°
30°
ARABIAN SEA
INDIAN OCEAN
BAY OF BENGAL
GULF OF SIAM
TROPIC OF CANCER
BALUCHISTAN
GREAT RAJPUTANA DESERT
BRITISH INDIA
CENTRAL INDIA
NORTH WESTERN PROV.
CENTRAL PROV.
BERAR
HYDERABAD
MADRAS
BURMA
SHAN STATES
LAOS STATES
BHOTAN
NEPAL
CEYLON
COLOMBO
CALCUTTA
BOMBAY
MADRAS
RANGOON
BANGKOK
LACCADIVE ISLANDS
ANDAMAN IS.
NICOBAR ISLANDS
KHATMANDO
KHALAMBA PEAK 17,200 ft.
KARAKORUM MTS.
COLUMBUS MTS.
CONJECTURAL MTS.
MARCO POLO MTS.
TSAIDAM
Ten Degree Channel
Nine Degree Channel
Eight Degree Channel
Sombrero Channel
Palk Strait
Gulf of Mannar
Gulf of Martaban
Gulf of Cutch
Mouths of the Indus River
Mouths of the Ganges and Brahmapootra
Mouths of the Mahanuddy
Mouths of the Godaveri
Mouths of the Kistna
Mouths of the Irawaddy
Mouths of the Tenasserim
Mouths of the Menam
Mouths of the Mekong
Mouths of the Yangtse
Mouths of the Hoang ho
Mouths of the Amur
Mouths of the Yenisei
Mouths of the Ob
Mouths of the Volga
Mouths of the Danube
Mouths of the Rhine
Mouths of the Seine
Mouths of the Loire
Mouths of the Tagus
Mouths of the Ebro
Mouths of the Rhone
Mouths of the Po
Mouths of the Tiber
Mouths of the Nile
Mouths of the Niger
Mouths of the Congo
Mouths of the Zambezi
Mouths of the Orange
Mouths of the Murray
Mouths of the Darling
Mouths of the Murrumbidgee
Mouths of the Lachlan
Mouths of the Macquarie
Mouths of the Bogan
Mouths of the Darling
Mouths of the Murray

called 'an epitome of the whole earth,' consisting as it does of mountains far above the level of perpetual snow; broad and fertile plains bathed in intensest sunshine, arid wastes, and impenetrable forests. Its great natural divisions are the sub-Himalayan countries, the plain of the Ganges, the plain of the Indus, the highlands of n. Hindustan, and the peninsular portion of the country s. of the Vindhya Mountains.

The Sub-Himalayan Countries form an elevated tract between the chief ridge of the Himalayas and the lower elevations which adjoin the plains of the Ganges and Indus. They consist of Cashmere, Gurhwal, Kumaon, Nepaul, Sikkim, and Bhotan, all hill-countries, which, owing to their elevation above the sea, have a cool climate and the vegetation of the temperate zones. These regions are separated from the plain of the Ganges by the Terai, or Great Indian swamp, which extends in a long belt, 5 to 25 m. in width, from Hurdwar to the Brahmaputra. It is covered with great forest trees, and is the haunt of innumerable wild beasts. The soil is very fertile, but malaria renders it uninhabitable by man and the domestic animals, at least from April to October. It is said to be then abandoned by even the wild beasts. This wilderness forms a great physical barrier between the hill-countries and the plains, and separates populations distinct from each other in race and language.

The Plain of the Ganges, which includes Bengal, Bahar, the Doab, Oude, and Rohilcund, is a vast alluvial flat, extending from the Bay of Bengal to the Punjab. Throughout its entire length, the Ganges and its numerous tributaries spread out like the veins of a leaf, carrying everywhere their fertilizing influence. The population of these fertile and well-cultivated plains is very dense. Scattered over the agricultural districts, and massed in the great cities and towns, there are not less than 100,000,000 people.

The Plains of the Indus, in the n.w., are less extensive than those of the Ganges, and are separated from the latter by the Aravulli Hills. The Punjab occupies the n. portion. S. of the Punjab, and parallel with the river, the great sandy desert of the Indus extends nearly 500 m. The valley of the Indus is continued through Sinde to the ocean. The plains of the Indus may be considered to include Cutch and Gugerat, which like them slope toward the Arabian Sea. Between the Indus and the Aravulli Mountains lies the Thur or Indian desert, an expanse covered with sand-hills, 40 m. long and 100 broad. It is only in the neighborhood of the Indus and the Luni that the surface can be cultivated—though crops of grain may be grown in a few narrow valleys after the rains. This almost impassable desert is described in Hindu geography as 'the region of death.' Like the

Terai, it forms a great physical barrier separating w. and e. India.

The Highlands of Northern Hindustan extend from the Vindhya Mountains, as a base, to the border of the Thur. They include the table-land of Malwa and Rajpootana, or Rajasthan, which has an elevation of about 2,000 ft. above sea-level.

The Peninsular Portion of India, s. of the Vindhya Mountains, which remains to be considered, is called by the natives the Deccan (q.v.). The most remarkable geographical feature of this area is a central table-land —a vast plateau—from 12° to 21° n. lat., 2,000 to 3,000 ft. above the sea, and inclosed on all sides by lofty mountains, between which and the sea on the e. and w., are narrow strips of low, flat country, divided into several districts. From the low country on the coast to the central table-land, the mountains rise abruptly, in a succession of gigantic terraces or steps; hence the name of 'Ghauts' (q.v.). The rivers of the Deccan rise in the W. Ghauts, and after traversing the table-land, descend to the sea over the E. Ghauts. The slope of the country corresponds with the course of the rivers; it has a gradual inclination toward the east. Ceylon, the Lacadive, and Maladive Islands also may be considered to belong to this part of India.

The *Himalaya* (q.v.) and the *Suliman* Mountains (see AFGHANISTAN) far exceed in altitude the chains which lie within the boundaries of India. The *Vindhya* Mountains, which cross India between 22° and 25° of n. lat., and separate Hindustan proper from the s. or peninsular portion of the country, nowhere exceed 6,000 ft. in height. The Satpura range, between the Nerbudda and Tapti valleys, is a spur of the Vindhya. The *Western Ghauts* run parallel with the Indian Ocean at a distance of 20 to 40 m. At Mahabaleshwar, the sanitarium of Bombay, they rise to 4,500 ft., but they are lofty near Coorg, where one summit has an elevation of 7,000 ft. On the opposite coast, forming the s.e. buttress of the table-land of the Deccan, are the *Eastern Ghauts* (see GHAUTS). The physical geography of southern India presents the singular phenomenon of isolated masses upheaved amid the vast plains that occupy the greater portion of the peninsula. Of these the most remarkable are the Neilgherries (q.v.) or Blue Mountains, which cover 600 sq.m. Ootacamund (q.v.), the great sanitarium of s. India, situated in the midst of them, has an elevation of 7,400 ft. Of the minor mountain-ranges of India, the principal are the Sewalik range, near Hurdwar, 3,000 ft.; the Kala or Salt range, adjacent to the Suliman range, 2,500 ft.; the Aravulli, between the basins of the Ganges and the Indus, culminating in Mount Abu, 5,000 ft.; the Kattywar Hills, 1,000 to 3,000 ft. in the centre of the Kattywar peninsula; the hills of Bundelcund, 2,000 ft.; and the Rajmahal Hills, 5,000 to 7,000 ft.

The *River-system* of India is on a grand scale. The Indus (q.v.) traverses the n.w., and drains about 400,000 sq.m. The Ganges (q.v.), on the n.e., together with its tributaries, drains about 500,000 sq.m. The Brahmaputra (q.v.) has a course of more than 600 m. from the point where it leaves the Himalaya to that where it enters the Bay of Bengal. The e. side of India—the region s. of the Nerbudda, and e. of the Malabar Ghauts—is watered by 18 rivers, the principal being the Godavery, 830 m. long; Kistna, 800; Cauvery (Kaveri), 470; Mahanadi, 520; Brahmini, 400; North Pennar, 350; and the South Pennar, 240. About 20 rivers water the w. side of India. The most noteworthy are the Nerbudda, 800 m. long; the Tapti, 400—both of which flow into the Gulf of Cambay; the Myhi, 350 m.; Luni, 320 m.; Bunnas, 180 m.; and the Bhadro, 130 miles.

Geology.—From observations at different points in India, the general features of its geological structure are known. A staff of geologists commenced more than a quarter of a century ago a geological survey of India, which has since proceeded. They have examined an area several times as large as that of Great Britain, and supplied, for the districts that they have dealt with, an accurate knowledge of the mineral resources of India.

India is bounded n.e. by the range of the Himalaya, the great water-shed of central Asia. These mountains consist of granitic rocks which have penetrated the stratified rocks, thrown them up in endless confusion, and metamorphosed them in many places into gneiss, mica-schist, clay-slate, or crystalline limestone. Layers of sandstone and conglomerate extend along the base of the mountains. They are of Miocene age, containing the remains of species of camel, giraffe, hippopotamus, sivatherium, elephants, crocodile, and tortoise. These are extensively developed in the Sewalik Hills. An immense tract of Post-tertiary alluvial deposits covers the whole of the river-basins of the Ganges and the Indus, stretching across n. India from sea to sea. The E. and W. Ghauts consist of metamorphic rocks, which are continued across the country n. of the Godavery. Between this transverse band of altered strata and the diluvial deposits of the n. a large tract is occupied with Paleozoic rocks, frequently broken through and covered with different kinds of trap, and in some places overlaid with Secondary and fresh-water Tertiary strata. One of the most important labors of Prof. Oldham and his geological staff has been the exploration of the great Indian coal-fields. They lie in a region bounded n. by the Ganges, and extending s. beyond the Godavery. The coal comes from one geological formation called 'Damuda,' from the river Damodar, in the valley of which the chief beds occur. It differs little geologically from the carboniferous beds of England. Iron, copper, and lead are worked in different parts of India. Salt is obtained from the

Salt range; also by evaporation. Diamonds are still found; and of late the gold mines of India have awakened interest.

Vegetable Productions.—The vegetation of India is as varied as its soil and climate, and passes from the flora of a tropical to that of an alpine region. The groves of palm that border the coast, and, in the interior, the umbrageous mango topes, are striking features of Indian scenery. Rice is the chief article of food, and is produced in all parts of the country in which irrigation is practiced. Maize and wheat are the grains cultivated in the N. W. Provinces. Tea is one of the most valuable products of India, and for many years has been one of the largest exports to England; 1905-6, value of tea exported £5,156,921, only wheat and jute exceeding it in value. Coffee, also, till lately the staple product of Ceylon, is grown in India. Tea cultivation is now carried on with success in Ceylon, Assam, and several hill-districts. Cinchona, introduced from S. America 1860, has been naturalized with great success, at a cost of £61,719. 'The return,' Mr. Markham says, 'represents a value which is simply incalculable and without price;' a cheap supply of quinine being one of the most certain means of averting the fevers that prevail in the hot and moist parts of India. As a commercial speculation, the measure ultimately will prove highly remunerative. The growth of cotton has been much extended since the American war of secession; the finest is produced in Berar. The rhea, or jute plant, is grown in Assam and Bengal, and has recently given rise to an important trade. India-rubber is another important product of Assam, the demand for which is increasing. Tobacco is now largely grown. Of late, great attention has been given to the importance of preserving the Indian forests. The destruction of the woods was found to give rise to destructive floods, and to render the water-supply uncertain and capricious during the dry season. The Indian cultivators have been rapidly improving in prosperity, and with that improvement there has been increasing demand for timber for house construction and furniture—a demand further augmented by the requirements of the railways. To protect existing forests, and extend the area of the timber-producing districts, the Indian Forest Conservancy Dept. was organized, the main objects of which were the definition and demarkation of reserved forests, and the prevention of jungle fires—that is to say, of the native practice of burning forests for cultivation, and the cutting and clearing away of creepers around the young trees. The system of preparing candidates for forest service was commenced 1867, when the first examination was held by the civil-service examiners. Since that time a large number of officers who have studied forestry in England, Germany, and France have been sent to India, and great satisfaction has been expressed with their work.

Animals.—The domesticated animals are horses, asses, mules, oxen, buffaloes, sheep, and elephants. Of wild beasts, the most formidable is the Bengal tiger. The other beasts of prey are leopards, wolves, jackals, panthers, bears, hyenas, lynxes, and foxes. Of poisonous snakes, the cobra da capello, or black-hooded snake, the cobra manilla, and sand snake are the most common. The number of people killed by wild beasts is notable.

Climate.—In a country extending over 26° of latitude —one extremity of which runs far into the torrid zone, and the other terminates in a range of lofty mountains rising far above the line of perpetual snow—a country embracing within its ample circumference lowland plains, elevated plateaux, and alpine regions, the climate must differ greatly. Hindustan proper may be said to have three well-marked seasons—the cool, the hot, and the rainy. The cool months are Nov., Dec., Jan., and a part of Feb.; the dry hot weather precedes, and the moist hot weather follows the periodical rains. The climate of south India is greatly regulated by the Monsoons (q.v.). The central table-land is cool, dry, and healthy. At Ootacamund, on the Neilgherries, 7,300 ft. above sea-level, the mean annual temperature is 57° F.; at Madras, 83°; Bombay, 84°; Calcutta, 79°; Bangalore, 74°; and at Delhi, 72°. The fall of rain varies greatly in different parts. A map of the Indian rainfall given by Mr. Markham in his Report, 1873, shows that in the whole of north-eastern India, from the valley of the Sutlej to the mouths of the Irrawaddy, including the sub-Himalayan countries, Assam, and British Burmah, and between the W. Ghauts and Coromandel coast, it exceeds 75 inches. In the interior of the Deccan it is less than 30, and in Multan, and Sinde less than 15 inches. The remainder of India is between the extremes represented by these damp and dry belts, but is, as compared with Europe, an arid country. Hence the necessity of tanks and irrigation canals to supply moisture to the soil, and to obviate the danger of dry seasons.

Inhabitants.—Three races widely distinguished from each other inhabit India. In the n.e. are Mongols, resembling the Tibetans, and Burmese; in the s. Dravidians, the relation of whom to other great branches of the human family is still a subject of dispute; and in the n.w., Aryans. It is supposed that at a remote epoch a branch of the Aryan (q.v.) race entered the peninsula from the n.w., established themselves first in the Punjab, and thence gradually diffused themselves over the whole of n. and central India, imbuing the subject population more or less completely with their religious system and their language, and thus forming the Hindus. Tribes still inhabiting the mountainous districts and jungles are supposed to be outstanding islands of the aboriginal population that resisted the tide of Hindu conquest and civilization. The Hinduizing influence extended feebly,

if at all, into the Deccan, the great majority of whose inhabitants, therefore, are supposed not to belong ethnologically to the Aryan race.

Prof. Friedrich Müller thus distributes the Indian races according to their languages:

A. *Mongols*—(1) Tibetans, subdivided into Tibetans Proper, in upper terraces of the Himalaya; and s. of them, the sub-Himalayan tribes, speaking Lepcha, Kiranti, Limbu, Murmi, etc. (2) The Birman or Lohitic races, speaking Burmese of Aracan, Kooch, Dhimal, Bodo, Garo, Miri, Singpho, Naga, Kuki, etc. (3) The Thai, or Siamese races, speaking Ahom, Khamti, etc.

B. *Dravidians*, subdivided into—(1) The Munda branch—Kol (in Chota Nagpore), Sontal, Ramusi, Warali, Bheel, etc. (these are now usually separated from the Dravidians, and made a *Kolarian* group). (2) The Dravida branch proper—Tamul, Telinga, Canarese, Malayala, Tulava, Toda, Gond, Khond, Rajamahal, Kol, Brahui (in Beloochistan). (3) The Singhalese branch in Ceylon, including the Veddahs. The Tamul, Telinga, Canarese, Malayala, Tulava, and Singhalese are spoken by cultivated races; the other languages by rude hill-tribes.

C. *Aryans*, subdivided into—(1) The races of Dardistan and the n.w. frontier, including the Siah-posh Kafirs, and other rude tribes. (2) The Hindus, including the cultivated races speaking the following languages: Cashmiri, spoken in Cashmere; Punjabi, in the Punjab; Hindi, in various dialects sometimes described as languages, spoken in the w. plain of the Ganges and Mulwa; Sindhi, in Sinde; Cutchi, in Cutch; Gugerati, in Gugerat; Mahrati, in the n.w. Deccan, s. of the Vindhya Mountains; and Bengali, spoken in the plain of the Ganges, e. of the bend of the river Rajmahal; and the Orya, Assami, and Nepauli, all resembling the Bengali, and spoken in Orissa, Assam, and Nepaul by the Hindu inhabitants. For an account of the connection of these languages with the old Prakrit dialects of India, see SANSKRIT; PALI.

The word Hindu is used in various senses, and it is important to guard against the confusion that may thence arise. It is applied (1) to the people speaking the Hindi dialect of the N. W. Provinces; (2) to the Aryans of n. India; (3) to the cultivated races of India, both Aryan and Dravidian, who profess the Hindu religion, and have been influenced by the Indian civilization common to both. The cultivated peoples of India professing the Hindu religion, or Hindus in the third sense, not only differ in language in different provinces of India, but in customs and dress. The Mohammedan population on the other hand, in all parts of India, wear the same dress, affect the same customs, and speak one language—Hindustani or Urdu, a dialect which sprang up at the Mohammedan court of Delhi, and which is a

highly cultivated form of Hindi intermixed with a large number of Persian and Arabic words. It is the language used by the British government in official business. In several provinces attempts have been recently made to substitute for it the local languages, such as Sindhi and Assami, many of which have received little literary cultivation.

The chief vernacular languages in which books are published are: Urdu (Bengal N. W. Provinces, Punjab, Bombay), Bengali (Bengal), Hindi (Bengal, N. W. Provinces, Punjab, Bombay, and Central Provinces), Punjabi (Punjab), Marathi (Bombay and Central Provinces), Gujarathi (Bombay), Tamil and Telugu (Madras), and Burmese (Burma), and the bilingual works are mostly either in English and another language, or in a classical and a vernacular language. Many works are also published in English alone, or in one of the three classical languages, Arabic, Sanskrit, and Persian. The greater number of these publications belong to the departments of poetry, religion, philosophy, and philology, but Urdu and Hindi fiction has developed greatly in recent years. Till about 1850 newspapers were prevailingly religious, but since then the native press has become more and more a medium for the discussion of social and political questions.

In India there are rude tribes belonging to the Mongol, Dravidian, and Aryan races. The Siahposh Kafirs and kindred tribes of Dardistan are undoubted Aryans, who know nothing of Hindu culture. The Mongols n. and e. of the Terai, in the same way, have none of the culture of Bhotan, Tibet, and China. They have caused much trouble on the Assam frontier, where several districts are excluded from the operation of regular laws, and the deputy-commissioner of Assam now holds an annual meeting of the hill-tribes. The Angami Nagas 1854-65 made 19 raids into the plains, and killed 236 people; but in the latter year a military post was occupied in their country, and the raids have ceased. The hill-tribes of the Dravidian race also are in the lowest stage of savagery. Among the most important and best known of them are the Bheels, in Candeish; and the Khonds and Koles, who inhabit Orissa. The former were wont to live by plunder, and used to burst out of their jungles like tigers, committing most frightful excesses; but in 1825, after various methods of subduing them had been unsuccessfully tried by the British govt., it was resolved to tempt them into military service. A Bheel corps was raised, into which all the wilder spirits were drafted, and the result has been a decided improvement in the habits and disposition of the rest of the people. Roads have now been made through their country, and property is safe. The Khonds and Koles, however, are perhaps a more interesting race, since they have preserved more completely what may be regarded as the primitive religion of Hindu-

stan. Forced into the jungles and mountains of central India by the victorious advance of the Aryan race from the n.w., they have preserved (in part at least), in their almost inaccessible retreats, the grim religion that prevailed in the peninsula before Brahmanism was heard of. That religion may be briefly characterized as Devil-worship. The Khonds sacrifice only to malignant deities, such as Siva the Destroyer, the goddess Kali, and the God of the Earth, whom they seek to propitiate by human sacrifice, principally of children, who, however, are not taken from their own race, but kidnapped from neighboring tribes. Successful efforts have been made by the British govt. to suppress these practices.

To the present civilized inhabitants of India, who, though generally a mixed race of Dravidian and Aryan origin, now form many distinct nations, no general statement can apply. The acute but timid Bengali resembles little the warlike Sikh of the Punjab, or the fierce Afghan of Rohilcund; and the patient weaver of Decca is wholly unlike the high-spirited Rajpût of central India. The Sikh is a born soldier, who despises the Hindu, and hates the Mussulman. He cares nothing for caste, and is brave, faithful, and independent. The Mohammedans of India are degenerate followers of the Prophet, and their religion is a strange mixture of the doctrines of the Koran with the idolatry of Asia. The Parsees, a mercantile and educated class, seated at Bombay and along the w. coast of India, are descendants of the fugitive fire-worshippers of Persia (see PARSEES). Of the morality of the civilized races of India in general, Mr. Markham says that, whatever may be said of the larger towns, the residents of villages are 'singularly temperate as a rule, chaste, honest, peaceful, singularly docile, easily governed, and patient.'

Two of the most striking peculiarities of the social condition of the Hindus are the institution of Caste (q.v.) and the *Village system.* The latter is very simple. A village in Hindustan does not mean a collection of houses at a particular spot, but corresponds rather to what is called a township in the United States. It is a district embracing an area of some hundreds or thousands of acres of land, and is under the administration of native functionaries, the principal of whom is the *potail* (head-inhabitant), a kind of chief magistrate, who superintends the affairs of the community, settles disputes, attends to the police and the collection of taxes. Among the functionaries are the *curnum,* who keeps a register of the produce and the names of the proprietors, and draws up all deeds of sale, transfer, etc.; the Brahman, or village priest; and the schoolmaster. Besides these, every village has its astrologer, smith, carpenter, potter, barber, doctor, dancing-girl, musician, and poet, all of whom are rewarded for their labors out of the produce of the village lands. 'Under this simple form of

municipal government, the inhabitants of the country have lived from time immemorial. The boundaries of the village have been but seldom altered; and though the villages themselves have been sometimes injured, and even desolated by war, famine, and disease, the same name, the same limits, and even the same families, have continued for ages. The inhabitants give themselves no trouble about the breaking up and division of kingdoms; while the village remains entire, they care not to what power it is transferred, or to what sovereign it devolves; its internal economy remains unchanged; the potail is still the head-inhabitant, and still acts as the petty judge and magistrate, and collector or renter of the village.'

Religion.—Hinduism or Brahmanism is the religion of the majority of the natives. Of 294,233,345 inhabitants of India, British and feudatory (1901) 207,146,422 were Hindus, 62,458,061 Mohammedans, 8,584,349 Animistics, 9,476,750 Buddhists, 2,923,241 Christians (see INDIA, BRITISH, *Christianity in*), 2,195,268 Sikhs, 1,334,148 Jains, 94,190 Parsees, 18,228 Jews, others 2,686. In Bengal there are 26,000,000 Mohammedans to 50,000,000 Hindus; in the Punjab, 12,000,000 to 10,000,000 Hindus; Central India, 500,000 to 6,900,000. Buddhism at one time prevailed throughout India; it is now confined to Bhotan, Ceylon, and the Burmese frontier. For several leading forms of religion prevalent among the natives of India, see BUDDHISM; MOHAMMEDANISM; PARSEES; SIKHS; what we shall here specially consider is that variety of creeds which is derived from Brahmanic sources, and known as the Hindu religion, or Hinduism. The term Hinduism, however, must not be taken as restricted to those forms of the Brahmanic religion which now exist; we have to look upon it as comprising all the phases of this creed from its earliest period.

We may divide Hinduism into three great periods, which for brevity may be called the Vedic, Epic, and Purânic periods; as our knowledge of the Vedic period is derived from the sacred books called the *Veda* (q.v.); of the Epic period, from the epic poem called the *Râmâyana* (q.v.), especially from the great epos, the *Mahâbhârata* (q.v.); while for the Purânic period the chief source of our information is that class of mythological works known under the name *Purânas* (q.v.), and *Tantras* (q.v.). It is necessary here to guard against attempt to connect dates with the earlier of those periods. It has been common for writers on this subject to assign thousands of years before the Christian era as the starting-point of various phases of Hindu antiquity; others, more cautious, marked the beginnings of certain divisions of Vedic works with B. C. 1,200, 1,000, 800, and 600 years. The truth is, that while Hindu literature itself is almost without known dates, owing either to the peculiar organization of the Hindu mind, or to the convulsions of Indian history, the present condition of Sanskrit philology does

not afford the scholar requisite resources for any chance of success in such chronological speculations. For this question of Hindu chronology, see more particularly VEDA. In the meantime, the utmost stretch of assumption which in the actual condition of Sanskrit philology it is permitted to make is, that the latest writings of the Vedic class are not more recent than B. C. 2d c. A like uncertainty hangs over the period at which the two great epic poems of India were composed, though there is reason to surmise that the lower limits of that period did not reach back of the Christian era. The Purânic period all scholars are agreed to regard as corresponding with part of European mediæval history.

If the *Rig-Veda*—oldest of the Vedas, and probably the oldest literary document in existence—coincided with the beginning of Hindu civilization, the popular creed of the Hindus, as depicted in some of its hymns, would reveal not only the original creed of this nation, but throw a strong light on the original creed of humanity itself. Unhappily, however, the imagination, indulging in such an hypothesis, would have as little foundation to work on as that which would fix the chronological position of this Veda. The Hindus, as depicted in these hymns, are far removed from the starting-point of human society; nay, they may fairly claim to be ranked among those already civilized communities experienced in arts, defending their homes and property in organized warfare, acquainted even with many vices which occur only in an advanced condition of artificial life (see VEDA). Yet in examining the ideas expressed in the greatest number of the Rig-Veda hymns it cannot be denied that they are neither ideas engendered by an imagination artificially influenced, nor such as have made a compromise with philosophy. The Hindu of these hymns is essentially engrossed by the might of the elements. The powers which turn his awe into pious subjection and veneration are—*Agni,* the fire of the sun and lightning; *Indra,* the bright, cloudless firmament; the *Maruts,* or winds (see MARUT); *Sûrya,* the sun (see SÛRYA); *Ushas,* the dawn (see USHAS); and various kindred manifestations of the luminous bodies, and nature in general. He invokes them, not as representatives of a superior being, before whom the human soul professes its humility; not as superior beings themselves, which may reveal to his searching mind the mysteries of creation or eternity, but because he wants their assistance against enemies—because he wishes to obtain from them rain, food, cattle, health, and other worldly goods. He complains to them of his troubles, and reminds them of the wonderful deeds that they performed of yore, as if to coax them into acquiescence and friendly help. 'We proclaim eagerly, *Maruts,* your ancient greatness, for the sake of inducing your prompt appearance, as the indication of (the approach of) the showerer of benefits;' or: 'Offer your nutritious viands to the

great hero (*Indra*), who is pleased by praise, and to *Vishnu* (one of the forms of the sun), the two invincible deities who ride upon the radiant summit of the clouds as upon a well-trained steed. *Indra* and *Vishnu*, the devout worshipper glorifies the radiant approach of you two who are the granters of desires, and who bestow on the mortal who worships you an immediately receivable (reward), through the distribution of that fire which is the scatterer (of desired blessings).' Such is the strain in which the Hindu of that period addresses his gods. He seeks them, not for his spiritual, but for his material welfare. Ethical considerations are therefore foreign to these instinctive outbursts of the pious mind. Sin and evil, indeed, are often adverted to, and the gods are praised because they destroy sinners and evil doers; but one would err in associating with these words our notions of sin or wrong. A sinner, in these hymns, is a man who does not address praises to those elementary deities, or who does not gratify them with the oblations they receive at the hands of the believer. He is the foe, the robber, the demon—in short, the borderer infesting the territory of the 'pious' man, who, in his turn, injures and kills, but, in adoring Agni, Indra, and their kin, is satisfied that he can commit no evil act. Yet we should be likewise wrong did we judge of those acts of retaliation by the standard of our own ethical laws. So far, indeed, from reflecting unfavorably on the internal condition of the Hindu community, the features of which may be gathered from these hymns, they seem, on the contrary, to bespeak the union and brotherhood which existed among its members; and the absence in general, of hymns which appeal to the gods for the suppression of internal dissensions or public vices, bears, apparently, testimony to the good moral condition of the people whose wants are recorded in these songs.

It may be imagined that the worship of elementary beings like those above mentioned was originally a simple and harmless one. By far the greatest number of the Rig-Veda hymns know of but one sort of offering made to these gods; it consists of the juice of the Soma or moon-plant, which, expressed and fermented, was an exhilarating and inebriating beverage, and for this reason, probably, was deemed to invigorate the gods and to increase their beneficial potency. It was presented to them in ladles, or sprinkled on the sacred Kusa grass. Clarified butter, too, poured on fire, is mentioned in several hymns as an oblation agreeable to the gods; and it may have belonged to this, as we hold, primitive stage of the Vedic worship.

There is a class of hymns, however, in the Rig-Veda which depart materially from the simplicity of the conceptions above referred to. In these, which we conceive to be of another order, this instinctive utterance of feeling makes room for the language of speculation; the

allegories of poetry yield to the mysticism of the reflecting mind; and the mysteries of nature becoming more keenly felt, the circle of beings which overawe the popular mind becomes enlarged. Thus, the objects by which Indra, Agni, and the other deities are propitiated, become gods themselves; Soma, especially, the moon-plant and its juice, is invoked as the bestower of all worldly boons. The animal sacrifice—the properties of which seem to be more mysterious than the offerings of Soma, or of clarified butter—is added to the original rites. We quote a few verses from the second book of the Rig-Veda, which may illustrate the essential difference between this order of hymns and those previously alluded to. It is the horse of the sacrifice which is invoked by the worshipper, and its properties are praised in the following strain:

'Thy great birth, O Horse, is to be glorified; whether first springing from the firmament or from the water, inasmuch as thou hast neighed, for thou hast the wings of the falcon and the limbs of the deer. Trita harnessed the horse which was given by Yama, Indra first mounted him, and Gandharba seized his reins. Vasus, you fabricated the horse from the sun. Thou, horse, art Yama: thou art Aditya, thou art Trita by a mysterious act: thou art associated with Soma. The sages have said there are three bindings of thee in heaven,' etc.

Mystical language like this doubtless betrays the aberration of the religious instinct of a nation; but it also reveals the fact, that the pious mind of the Hindus was no longer satisfied with the adoration of the elementary or natural powers; it shows religion endeavoring to penetrate into the mysteries of creation. This longing we find, then, expressed in other hymns, which mark the beginning of the *philosophical creed of the Vedic period.* The following few verses may tend to illustrate the nature of this third class of hymns, as they occur in the oldest Veda: 'I have beheld the Lord of Men,' one poet sings, 'with seven sons [i.e., the seven solar rays], of which delightful and benevolent (deity), who is the object of our invocation, there is an all-pervading middle brother, and a third brother [i.e., Vâyu and Agni, the younger brothers of Aditya, the sun], well fed with (oblations of) clarified butter. They yoke the seven (horses) to the one-wheeled car [i.e., the orb of the sun, or time, or a year]: one horse [i.e., the sun], named seven, bears it along: the three-axled wheel [i.e., the day with its three divisions, or the year with three seasons—hot, wet, and cold; or time—past, present, and future] is undecaying, never loosened, and in it all these regions of the universe abide. . . . . Who has seen the primeval (Being) at the time of his being born? What is that endowed with substance which the unsubstantial sustains? From earth are the breath and blood, but where is the soul? Who may repair to the soul to ask this? Imma-

ture (in understanding), undiscerning in mind, I inquire of those things which are hidden, (even) from the gods, (what are) the seven threads which the sages have spread to envelop the sun in whom all abide?' Another poet sings: 'Then there was no entity or non-entity; no world, or sky, or aught above it; nothing anywhere in the happiness of any one, involving or involved; nor water deep or dangerous. Death was not, nor was there immortality, nor distinction of day or night. But THAT breathed without afflation, single with her (*Swadhâ*) who is within him. Other than him, nothing existed (which) since (has) been. . . . . Who knows exactly, and who shall in this world declare, whence and why this creation took place? The gods are subsequent to the production of this world, then who can know whence it proceeded, or whence this varied world arose, or whether it uphold itself or not? He who in the highest heaven is the ruler of this universe, does indeed know; but not another one can possess this knowledge.'

As soon as the problem implied by passages like these was raised in the minds of the Hindus, Hinduism must have ceased to be the pure worship of the elementary powers. Henceforward, therefore, we see it either struggling to reconcile the latter with the idea of one supreme being, or to emancipate the inquiry into the principle of creation from the elementary religion recorded in the oldest portion of Vedic poetry. The first of these efforts is shown principally in that portion of the Vedas called *Brâhmana* (see VEDA), the second in the writings termed *Upanishad* (see UPANISHAD). In the *Brâhmanas*—a word of the neuter gender, and not to be confounded with the similar word in the masculine gender, denoting the first Hindu caste—the mystical allegories which now and then appear in what we have called the second class of Vedic hymns, are not only developed to a considerable extent, but gradually brought into a systematic form. Epithets given by the Rig-Veda poets to the elementary gods are spun out into legends, assuming the shape of historical narratives. The simple and primitive worship mentioned in the hymns becomes highly complex and artificial. A ponderous ritual, founded on those legends, and supported by a far more advanced condition of society, is brought into a regular system, which requires a special class of priests to be kept in proper working order. Some of the Vedic hymns seem to belong already to the beginning of this period of the Brâhmana worship, for in the second book of the Rig-Veda several such priests are enumerated in reference to the adoration of Agni, the god of fire; but the full contingent of 16 priests, such as is required for the celebration of a great sacrifice, does not make its appearance before the composition of the Brâhmanas and later Vedas. Yet, however wild many of these legends are, however distant they become from the instinctive veneration of the elementary powers of nature, and how-

ever much this ritual betrays the gradual development of the institution of castes—unknown to the hymns of the Rig-Veda—there are still two features in them, which mark a progress of the religious mind of ancient India. While the poets of the Rig-Veda are concerned chiefly in glorifying the *visible* manifestations of the elementary gods—in the Brâhmanas, their ethical qualities are put forward for imitation and praise. Truth and untruth, right and wrong—in the moral sense which these words imply—are not seldom emphasized in the description of the battles between gods and demons; and several rites themselves are described as symbolical representations of these and similar qualities of the good and evil beings, worshipped or abhorred. A second feature is the tendency, in these Brâhmanas, of determining the *rank* of the gods, and as a consequence, of giving prominence to one special god among the rest; whereas in the old Vedic poetry, though we may discover a predilection of the poets to bestow more praise, for instance, on Indra and Agni, than on other gods, yet we find no intention, on their part, to raise any of them to a supreme rank. Thus, in some Brâhmanas, *Indra*, the god of the firmament, is endowed with the dignity of a ruler of the gods; in others, the *sun* receives the attributes of superiority. This is no real solution of the momentous problem hinted at in such Vedic hymns as are quoted above, but it is a semblance of it. There the poets ask 'whence this varied world arose'—here the priest answers that 'one god is more elevated than the rest;' and he is satisfied with regulating the detail of the Soma and animal sacrifice, according to the rank which he assigns to his deities.

A real answer to this great question is attempted, however, by the Hindu theologians who explained the 'mysterious doctrine,' held in utmost reverence by all Hindus, and laid down in the writings known as *Upanishads*. It must suffice here to state that the object of these important works is to explain, not only the process of creation, but the nature of a supreme being, and its relation to the human soul. In the Upanishads, Agni, Indra, Vâyu, and the other deities of the Vedic hymns become symbols to assist the mind in its attempt to understand the true nature of one absolute being, and the manner in which it manifests itself in its worldly form. The human soul itself is of the same nature as this supreme or great soul: its ultimate destination is that of becoming reunited with the supreme soul, and the means of attaining that end are not the performance of sacrificial rites, but the comprehension of its own self and of the great soul. The doctrine which at a later period became the foundation of the creed of the educated—the doctrine that the supreme soul, or (the neuter) Brahman, is the only reality, and that the world has a claim to notice only so far as it emanated from this being, is already clearly laid down in these Upanishads, though the language in

which it is expressed still adapts itself to the legendary and allegorical style which characterizes the Brâhmana portion of the Vedas. *The Upanishads became thus the basis of the more enlightened faith of India.* They are not a system of philosophy, but they contain all the germs whence the three great systems of Hindu philosophy arose; and like the latter, while revealing the struggle of the Hindu mind to reach the comprehension of one supreme being, they advance sufficiently far to express their belief in such a being, but at the same time acknowledge the inability of the human mind to comprehend its essence. For the different periods which must be distinguished in the composition of these works, and for the gradual development of the general ideas briefly adverted to here, see UPANISHAD.

The EPIC period of Hinduism is marked by a similar development of the same two creeds, the general features of which have here been traced in the Vedic writings. The popular creed strives to find a centre round which to group its imaginary gods, whereas, the philosophical creed finds its expression in the groundworks of the *Sânkhya, Nyâya,* and *Vedânta* systems of philosophy. In the former, we find two gods in particular who are rising to the highest rank, Vishnu and Siva; for as to Brahmâ (masculine form of Brahman), though he was looked upon, now and then, as superior to both, he gradually disappears, and becomes merged into the philosophical Brahma (neuter form of the same word), which is a further evolution of the 'great soul' of the Upanishads. In the *Râmâyana,* the superiority of Vishnu is admitted without dispute; in the great epos, the *Mahâbhârata,* however, which, unlike the former epos, is the product of successive ages, there is an apparent rivalry between the claims of Vishnu and Siva to occupy the highest rank in the pantheon; but Sanskrit philology will have first to unravel the chronological position of the various portions of this work, to lay bare its groundwork, and to show the gradual additions that it received, before it will be able to determine the successive formation of the legends which are the basis of classical Hindu mythology. Yet it seems clear that even already during this Epic period there is a predilection for the supremacy of Vishnu; and that the policy of incorporating rather than combating antagonistic creeds, led rather to a quiet admission, than to a warm support of Siva's claims to the highest rank. For the character of these gods, for the relation in which the conception of these beings stands to that of the Vedic time, for the new ideas which they impersonate at the Epic period, and for the group of mythological beings connected with both of them, see their respective titles. We point, however, to one remarkable myth, as it will illustrate the altered position of the gods during the Epic period. In the Vedic hymns, the immortality of the gods is never matter of doubt; most of the elementary beings

are invoked and described as everlasting, as liable neither to decay nor death. The offerings that they receive may add to their comfort and strength; they may invigorate them, but it is nowhere stated that they are indispensable for their existence. It is, on the contrary, the pious sacrificer himself who, through his offerings, secures to himself long life, and, as it is sometimes hyperbolically called, immortality. And the same notion prevails throughout the oldest Brâhmanas. It is only in the latest work of this class, the *S'atapatha-Brâhmana,* and especially in the Epic poems, that we find the inferior gods as mortal in the beginning, and as becoming immortal through exterior agency. In the *S'atapatha-Brâhmana,* the juice of the Soma plant, offered by the worshipper, or at another time clarified butter, or even animal sacrifices, impart to the gods this immortality. At the Epic period, Vishnu teaches them how to obtain the *Amrita,* or beverage of immortality, without which they would go to destruction; and this epic *Amrita* itself is merely a compound, increased by imagination, of the various substances which in the Vedic writings are called or likened to *Amrita,* i.e., a 'substance that frees from death.' It is obvious, therefore, that gods like these could not strike root in the religious mind of the nation. We must look upon them as the gods of poetry rather than of real life; nor do we find that they received any of the worship which was allotted to the two principal gods, Vishnu and Siva.

The philosophical creed of this period adds little to the fundamental notions contained in the Upanishads; but it frees itself from the legendary dross which still imparts to those works a deep tinge of mysticism. On the other hand, it conceives and develops the notion, that the union of the individual soul with the supreme spirit may be aided by penances, such as peculiar modes of breathing, particular postures, protracted fasting, and the like; in short, by those practices which are systematized by the Yoga doctrine. The most remarkable Epic work which inculcates this doctrine is the celebrated poem *Bhagavadgîtâ,* wrongly considered by European writers as a pure Sânkhya work, whereas *S'ankara,* the great Hindu theologian, who commented on it, and other native commentators after him, have proved that it is founded on the Yoga belief. The doctrine of the reunion of the individual soul with the supreme soul, was necessarily founded on the assumption, that the former must become free from all guilt affecting its purity before it can be remerged into the source whence it proceeded; and since one human life is apparently too short for enabling the soul to attain its accomplishment, the Hindu mind concluded that the soul, after the death of its temporary owner, had to be born again, in order to complete the work which it had left undone in its previous existence, and that it must submit to the same fate repeatedly until its task is fulfilled. This is the doctrine of *metempsy-*

chosis, which, in the absence of a belief in Divine grace, is a logical consequence of a system which holds the human soul to be of a nature derived from the being of an absolute God. The beginning of this doctrine may be discovered in some of the oldest Upanishads; but its fantastical development belongs to the Epic time, where it pervades the legends, and affects the social life of the nation. See METEMPSYCHOSIS.

The PURÂNIC period of Hinduism is the period of its decline, so far as the popular creed is concerned. Its pantheon is nominally the same as that of the Epic period. Brahmâ, Vishnu, and Siva remain at the head of its imaginary gods; but whereas the Epic time is generally characterized by a friendly harmony between the higher occupants of the divine spheres, the Purânic period shows discord and destruction of the original ideas whence the Epic gods arose. Brahmâ withdraws, in general, from the popular adoration, and leaves Vishnu and Siva to fight their battles in the minds of their worshippers for the highest rank. The elementary principle which originally inhered in these deities is thus completely lost sight of by the followers of the Purânas. The legends of the Epic poems relating to these gods become amplified and distorted, according to the sectarian tendencies of the masses; and the divine element which still distinguishes these gods in the Râmâyana and Mahâbhârata, is now more and more mixed with worldly concerns and intersected with historical events, disfigured in their turn to suit individual interests. Of the ideas implied by the Vedic rites, scarcely a trace is visible in the Purânas and Tantras, the text-books of this creed. In short, the unbridled imagination which pervades these works is neither pleasing from a poetical, nor elevating from a philosophical point of view. Some Purânas, it is true—for instance, the *Bhâgavata*—make in some sense an exception to this aberration of original Hinduism; but they are a compromise between the popular and the Vedânta creed, which henceforward remains the creed of the educated and intelligent. They do not affect the worship of the masses as practiced by the various sects; and this worship itself, whether harmless, as with the worshippers of Vishnu, or offensive, as with the adorers of Siva and his wife Durgâ, is but an empty ceremonial, which, here and there, may remind one of the symbolical worship of the Vedic Hindu, but, as a whole, has no connection whatever with the Vedic scriptures, on which it affects to rest. It is this creed which, with further deteriorations through the lapse of centuries, is still the main religion of the masses in India. See PURÂNA.

The philosophical creed of this period, and the creed still preserved by the educated classes, is derived from the Vedânta philosophy. It is based on the belief of one supreme being, which speculation endeavors to invest with all the perfection conceivable by the human mind; but

its true nature is, nevertheless, declared to be beyond the reach of thought, and, on this ground, it is defined as not possessing any of the qualities by which the human mind is able to comprehend intellectual or material entity. See VEDÂNTA.

Hindu Sects.—The sects which arose during the third period of Hinduism, suppose that their worship is countenanced by the Vedas; but their worship derives its real origin from the *Purânas* (q.v.) and *Tantras* (q.v.). There are three chief divisions of these sects—the adorers of Vishnu, of Siva, and of the wives or female energies of these gods. See VAISHNAVAS; SAIVAS; SÂKTAS. There are also some minor sects.

For the philosophy, literature, architecture, etc., of India, see SANSKRIT LITERATURE; MÎMÂNSÂ; NYÂYA; SÂNKHYA; VEDÂNTA. For the history of India, see INDIA, BRITISH.

IN'DIA, BRITISH: collective name for those parts of Hither and Further India placed under the administration of the British viceroy or gov.gen. of India. It does not include Ceylon, which, though a British possession, has a separate government; but it extends along the e. coast of the Bay of Bengal to 10° s. lat., and thus includes part of Further India or Indo-China. The following table shows area and pop. of British India at the census of 1901; for the native states, see INDIA, NATIVE STATES OF.

British Provinces.	Area in sq. m.	Population in 1901.
Ajmere	2,711	476,912
Assam	56,243	6,126,343
BENGAL :—		
Bengal	70,184	41,259,982
Behar	44,197	24,241,365
Orissa	9,841	4,343,150
Chotá Nágpur	26,963	4,900,429
Berárs	17,710	2,754,016
BOMBAY PRESIDENCY :—		
Bombay	75,918	15,304,677
Sind	47,066	3,210,910
Aden	80	43,974
BURMA :—		
Upper	87,390	3,849,833
Lower	81,160	5,387,897
Central Provinces	86,459	9,876,646
Coorg	1,582	180,607
Madras	141,726	38,209,436
N.-W. PROVINCES AND OUDE :—		
N.-W. Provinces	83,198	34,858,705
Oude	23,966	12,833,077
Punjab	97,209	20,330,339
Baluchistan (British)	45,804	308,246
Andamans and Nicobars	3,188	24,649
Total	1,087,249	231,899,597

At the same date the pop. of the feudatory states (not including Nepal, Bhotan, or Cashmere) was 62,461,549; so that the aggregate pop. of Brit. India, in the widest sense, was the enormous total of 294,361,056. At the first census 1868-72, the districts directly administered had

185,537,859 inhabitants; and the native states were estimated to have about 50,000,000; giving a total of over 235,500,000. There are about 100,551 English, Scotch, and Irish in India.

In population, British and feudatory India together have more than all European states together, omitting Russia only; and more than twice the population of the whole Roman Empire, in its widest extent (120,000,000). British India, in the stricter sense, itself contains nearly one-seventh of the inhabitants of the entire globe.

In 1858, the government of India was transferred from the E. India Company (q.v.) to the crown, the queen was declared sovereign of India, and various changes in administration introduced; in 1877, the queen assumed the title Empress of India (Kaisar-i-Hind). The government of India is in the highest resort invested in a British sec. of state, who is a member of the cabinet; and has an under-sec. and a council of 15 members. The executive government in India is administered by the gov.gen., usually but not officially styled Viceroy, acting under the control of the sec. of state for India. The viceroy, appointed by the crown and holding office on an average about five years, is assisted by an executive council of six ordinary members (appointed by the crown), each of whom has charge of a department of the executive; together with one extraordinary member, the commander-in-chief. This council does not, however, sit as a cabinet. The 'legislative council' is composed of the members of the executive, together with 5 to 12 members appointed by the viceroy.

The time-honored division of British India was into the three great presidencies of Bengal, Madras, and Bombay; but this system, though still retained for military purposes, is administratively antiquated and obsolete, the presidency of Bengal having been split up into several district governments or provinces (see BENGAL). India is now divided into eight great provinces, together with four minor provinces administered by commissioners appointed by the gov.gen. (see table above). Madras and Bombay are under governors appointed by the crown, and have each two councils. Bengal has a lieut.gov. appointed by the viceroy, and a legislative council. The heads of the other provinces, whether ranking as lieut. govs. or chief-commissioners, are appointed by the vice roy; and have no legislative powers. The N.W. Provinces and Oude, formerly distinct, are now for most purposes united; the lieut.gov. of the N.W. Provinces being also chief commissioner of Oude. The Punjab has a lieut. gov.; Assam, the Central Provinces, and British Burmah are under chief commissioners. British territory is divided into regulation territory and non-regulation. The non-regulation provinces are those under chief commissioners; but there are also non-regulation districts in the provinces administered by lieut.govs. In the non-regula-

tion territory, as a rule, more discretion is allowed to the officials both in the collection of revenue and in the administration of justice. The lieut.govs. and most of the chief commissioners are chosen from the Covenanted Civil Service. These large provinces (Madras excepted) are further assigned into more than 50 *divisions*, each under a commissioner. The administrative units, however, are the *districts*, of which there are in all British India about 240. Each district, if in regulation territory, is under a collector-magistrate, if in non-regulation territory, a deputy-commissioner. The head of the district has most multifarious and responsible duties; being fiscal-officer charged with collecting the revenue, and civil and criminal judge, besides superintending police, jails, education, sanitation, and roads. Sometimes the executive and judicial departments are in different hands. The subordinate officers are deputy-collectors and assistant-magistrates. The district may be compared to a county or department; and varies in size from an area containing 1,500,000 inhabitants (in Madras) to one with only 200,000. Resident political agents are appointed by the British govt. at the courts of the native princes. The general administration of British India is conducted by members of the *Covenanted Civil Service*, the great majority of whom are British, though some natives of India hold appointments. The service is recruited from the successful candidates at competitive examinations in London. The *Uncovenanted Civil Service*, appointments to which are made by the authorities in British India, is composed of Europeans, Eurasians (offspring of native mothers by European fathers), and natives. A large number of Indian towns have obtained municipal institutions, which tend to diffuse the habit of self-government.

Military Force.—In 1858, the army of the E. India Company became the Indian military forces of her majesty. In 1905-6, the strength of the British garrison was 2,681 officers and 71,960 non-com. officers and men. The native army had 3,389 European officers, 151,858 native officers, non-commissioned officers and men. After April 1, 1895, the Indian presidency commands were abolished and the military control was no longer exercised by the governors in council of Madras and Bombay. Since then the army has consisted of the Northern, Eastern, and Western commands, and the Secunderabad and Burmah divisions, each under a lieutenant-general, who is under the direct command of the commander-in-chief of India and under the control of the government of India.

The Police in British India include a force of 150,148 constables or regular policemen, besides the village watchmen who aid them. The minimum age of admission is 17 years, the maximum 21. Each district has a jail and a police superintendent; and the districts are grouped, for police purposes, into circles under deputy-inspectors-general, while the whole police force in each province is

under an inspector-general. The constabulary is a purely civil force, subject in all respects, except internal discipline, to the civil authorities.

Administration of Civil Justice.—In 1861, by an act of parliament, high courts of judicature were established at each presidency and in the N.W. Provinces, under the control of a chief-justice, and as many other judges, not exceeding fifteen, as his majesty may appoint. In 1900, there were 207,513 civil suits in India, and there can be no doubt that the machinery for litigation supplied by the courts is much employed. Sir George Campbell, however, fears that the tendency to uphold the bare doctrines of law—the literal fulfilment of contracts alleged to have been entered into by ignorant and improvident people—leads to great hardship in cases which affect poor men and benefit the rich and litigious. The Civil Procedure Code of India offers facilities for litigation which are apt to be abused. Sir George Campbell, in illustration of the views entertained of legal proceedings by some classes of Indian litigants, gives the following account of a litigation between the members of a family originally belonging to one of the hill-tribes. One of the parties, after litigating through all the courts of India, got a decree in the highest court. But there was an appeal to the privy council, and the suitor's funds were exhausted. So they caught an old man, carried him to the top of the hill, and sacrificed him to propitiate the gods who rule the decisions of the privy council. The Civil Procedure Code worked such mischief among the Sontals, that the people were exasperated, and had to be removed from the operation of laws applicable generally in Bengal.

Revenues and Expenditures.—The net revenue of India in 1904-5 was approximately £49,000,000, the expenditure £46,000,000, and the surplus over £3,000,000; in 1905-6, the revenue was £48,500,000, the expenditure £46,750,000, and the surplus £1,800,000; the estimated revenue for 1906-7 was £48,800,000, the expenditure £48,000,000, and the surplus £800,000. In 1906, the funded debt amounted to £213,919,073 and the floating debt to £17,853,939, or a total in United States currency of $1,127,923,363. Of the funded debt 1,161,913,883 rupees represented the permanent debt in India and £130,307,890 the permanent debt in England; of this floating debt £4,000,000 represented India council bills and 216,961,391 rupees the miscellaneous obligations of the Indian governments. In India the govt. has always been considered the owner of the soil, and the actual cultivators pay a rent or tax, in collecting which different systems have hitherto been followed in different parts of the country, known as the *Zemindari Settlement, Ryotwar,* and *Mouzawar* or *Village Settlement.* The latter is the oldest and the simplest system. Each village under this arrangement was regarded as a separate municipality, and each was assessed by the govt. at

a particular sum, for the due payment of which the headman of the village was considered responsible. The individual distribution of the burden of taxation rested with the village authorities; and govt., provided it received its regular dues through the *potail*, interfered no further. The origin of the Zemindari and Ryotwar Settlements requires some explanation. When the English first entered on the administration of the country, they found that the practice of native sovereigns, their predecessors, had been to farm out the land revenues of the country to the nobles of the court, or to wealthy bankers, who annually paid a fixed amount into the royal treasury, and collected the govt. dues on their own behalf, from the actual cultivators of the soil. These farmers of the revenue were termed Zemindars. The question for the English rulers arose, whether or not they were to consider these men as proprietors. In Bengal and Bahar they were so recognized, and confirmed in their position, the govt. holding them responsible for the payment of the dues on their estates, and regarding the cultivators on the farms as their tenants. This was Lord Cornwallis's Zemindari Settlement. In Madras and Bombay, the opposite course was pursued. Claims of the middlemen, or farmers of the revenue, to enjoy any proprietary rights were totally ignored; and under Sir Thomas Monro, the ryotwar system was introduced, by which govt. makes a separate settlement with each individual cultivator or *ryot*, who is recognized as the virtual proprietor of the land, or tenant direct under govt., so long as he pays the land-tax annually charged on his estate or farm. In 1871, under the administration of Lord Mayo, there was created a new dept. of revenue, agriculture, and commerce. It has charge of all questions relating to land revenue and settlements, works of agricultural improvement, silks and fibres, forests, commerce, trade, and the industrial arts. It has also under its charge the collection of statistics, placed under another new dept., the statistical survey of India. A series of leading questions has been issued by the director-gen., showing exactly what information is required from residents in the different districts. A connected account of each district will be prepared from the returns, and these will be in turn condensed by the director-gen. into an imperial statistical account of India. 'This survey,' says Mr. Markham, 'forms an epoch in statistical enterprises, and its practical results will be most important.'

Currency.—In British India accounts are kept in rupees, annas, and pie—16 annas going to the rupee, and 12 pie to the anna. The coins are rupees (value 2*s*. sterling), and half and quarter and half-quarter rupees, in silver; and in copper, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{6}$, $\frac{1}{12}$ of an anna. The currency of India, however, is chiefly silver, of which a large amount is coined annually. The coinage bears the impress of Queen Victoria as Empress of India in the

native costume. In 1861, an act was passed by the govt. of India providing for the issue of a paper currency by means of promissory notes.

The foreign commerce 1906-7 amounted to about £105,500,000 exports and £68,750,000 imports. The chief articles of import were cotton woven goods, metals and hardware, oils, chiefly petroleum; sugar, railway material, machinery and mill-work, cotton yarns, chemicals, medicines, dyes, woolen goods, silk, raw and manufactured; provisions, liquors, and apparel. The chief exports were: jute, raw and woven; husked rice, hides and skins, oil-seeds, raw cotton, tea, opium, cotton yarns, wheat, indigo, coffee, raw wool, and cotton woven goods. The proportion of trade directly with European countries is about 63½ per cent., omitting the trade with Egypt, much of which really goes to Europe. The trade with the United Kingdom is over 70 per cent. of the trade with Europe and nearly 45 per cent. of the total trade.

Manufactures.—The domestic industries of India, such as weaving and spinning, pottery, brass-work, iron-work, and art work of many kinds, continue to be practised after ancient methods all over the continent of India. But Indian fabrics and products, made on a small scale by workers at their homes, have for years past been giving way before the cheaper, less artistic, and often less durable cotton yarn and fabrics, and the iron or steel products of British factories. Meanwhile an important manufacturing industry has been growing up, and steam-power factories are at work, among which those for spinning and weaving cotton, for spinning and weaving jute, for making paper, for husking and cleaning rice, for sawing timber, and for brewing beer are the most important. Steam power is also largely employed in factories, on tea gardens, and indigo estates.

Roads and Railways.—Since 1836 great trunk-roads have been constructed in various parts of India: the most remarkable is from Calcutta to Peshawer, 1,400 m. long. The importance of these great works has now diminished, owing to the extension of a great railway system. The chief railways now open are the E. Indian, Calcutta to Delhi; the Indian Peninsula, which forms a branch to Bombay; the Delhi, Punjab, and Sinde, which will ultimately connect the system with the mouth of the Indus; the Bombay and Baroda, which runs n. from Bombay; the Madras railway, running s.e. to Madras, and thence s.w. to Beypûr on the Coromandel coast. The railroads are largely owned by the state, and are worked partly by the state and partly by companies guaranteed under contract. Other companies owning railroads are subsidized by the central and local governments. The mileage in 1906 was 28,221.

Irrigation Works and Canals.—We have already referred to the importance of irrigation in India, and the great attention given to the subject in late years. Great

works have recently been undertaken in the basins of the Indus, Ganges, Mahanaddy, and Tapti, and in other parts, to supply water to the rich but parched soil, and thus extend the area of cultivation. Several of the canals are adapted for navigation as well as irrigation—e. g., the Sirhind canal, connected with the Sutlej, 500 m. long, opened 1882. To give the greatest possible efficiency to the action of the govt. in relation to the extension of canals, an inspector-gen. of irrigation works has been appointed, with irrigation secretaries in the various provinces, and in 1901 a special commission was appointed to enquire into the development of the irrigation system of India, and many of their recommendations have since been adopted.

Disease in India.—The climate and sanitary condition of India give rise to pestilences which at intervals carry desolation over the country, while disease in its worst form is never absent. Hospitals, richly endowed and admirably regulated, supported by govt. and by private munificence, are in all the large towns; and great efforts are constantly made to bring the benefits of medical skill and knowledge within reach of the poorer classes. In all parts of the country dispensaries have been opened, where medicines are given out, and patients advised. Much of the disease is due to bad water and bad drainage; and where a new water-supply has been introduced, and drains have been made, as in Calcutta, the improvement in the health of the inhabitants has been marked. Mortality is fearfully aggravated by the passion of the people for pilgrimages. All ages and sexes traverse vast areas, and die by hundreds on the route. The Mohammedan pilgrims go in numbers to Mecca, Kerbela, and Jerusalem; and a large proportion never return.

Emigration and Colonization.—From the table at the head of this article, it appears that the population of British India is very unequally distributed. While Bengal resembles a city in the density of its population, the adjoining provinces of Assam and Burmah, though no less fertile, have a very small number of inhabitants. The recurrence of famines in the overpeopled district shows the importance of encouraging emigration. The tea-planters have of late attracted crowds into Assam and other districts. The distant emigration from British India has become very important in recent years, and to regulate it the Indian Emigration Act (1871) was passed, consolidating all previous laws for the protection of the emigrant coolies. One condition with respect to emigration from India to the British colonies is, that there shall be 40 women to every 100 men. In 1874, the number of Indian emigrants who left for various foreign destinations reached the total of 29,243; whereas in 1901 there was a total emigration of only 21,613 Indian coolies from Calcutta, Madras, and the French ports. As a rule, the Indian emigrants improve their condition by service in

the West Indies. It is thought that, except to a few limited districts, colonization from England must ever be impracticable in India on account of the unfavorable climate; for the European race settled in the country rapidly degenerates, and in a few generations becomes effete, and bodily and mentally enervated. A constant stream of British capital, however, and fresh directing energies in its application, is the great want, and would secure, as nothing else can, the development of its unlimited resources. Indigo and sugar factories, and coffee and tea plantations, have been the principal undertakings in which independent British capital and energy have been hitherto embarked, and the results have been most satisfactory.

Christianity in India.—India was one of the earliest fields of Christian missions. Tradition assigns it as the scene of the apostle Thomas's labors and martyrdom. Whether this was the case or not, we find a Syrian church planted in Malabar in s. India, which undoubtedly had a very early origin. The Jesuit missionaries, from the middle of the 16th c. onward, had large success in India: see XAVIER. The total number of Christians in India, according to the census of 1901, was 2,923,241, of whom 1,202,039 were Rom. Catholics, 453,612 Anglicans, 53,829 Presbyterians, 220,863 Baptists, 157,847 other Protestants, and 250,464 Syrians, Armenians and Greeks. There were 1,580,179 Christians in the province of Madras. The Rom. Catholics are mainly in Portuguese and French territory, and in the native states of Travancore, Cochin, and Pudukota (largely descendants of the old Nestorian converts). The earliest Prot. missionaries in India came from Holland and Denmark: with the latter mission the eminent Schwartz was connected. England's first missionary effort was put forward by the Soc. for the Propagation of the Gospel, and the Christian Knowledge Soc., which commenced in the beginning of the 18th c., by aiding the Danish mission already established in s. India. Subsequently, the E. India Company adopted the policy of excluding missionaries altogether from their territories; but since the beginning of this century, when these restrictions were withdrawn, a great work has been done, in which many denominations are represented. In Bengal, 16,000 ryots profess Protestantism. In Chota Nagpore, within the last 20 years, German missionaries have converted 20,000 Koles. In Oude and Rohilcund, there are 2,000 converts. In southern India the numbers are much greater. Mr. Markham, who gives these figures in his Report for 1873, speaking of the Prot. missions, says: 'The government of India cannot but acknowledge the obligations under which it is laid by these 600 missionaries, whose blameless example and self-denying labors are infusing new vigor into the stereotyped life of the great population placed under English rule, and are preparing them to be in every way better men and

better citizens of the great empire in which they dwell.' In the Proclamation to the Princes, Chiefs, and People of India, read in the principal cities 1858, Nov. 1, it was declared, 'that none shall be in anywise favored, none molested or disquieted, by reason of their religious faith and observances, but that all shall alike enjoy the equal and impartial protection of the law.' The fullest toleration in matters of faith exists throughout British India. Fanaticism only, as when it seeks to enforce the burning of widows or Suttee (q.v.), or offers human beings in sacrifice, is curbed by the ruling power. There is no exclusively endowed state church, but govt. continues to pay the state grants made to Hindu temples and to Mohammedan mosques. Clergymen of the Church of England, the Church of Scotland, and the Rom. Cath. Church, are retained on the govt. establishment as civil or military chaplains. There are Church of England bishops at Calcutta, Madras, and Bombay.

Education.—The education of the people is based on the system set forth in a dispatch of Sir Charles Wood, 1854, July 19. The main principle of the dispatch was that European knowledge should be diffused through the languages understood by the great mass of the people; but that the teaching of English should always be combined with careful attention to the study of the vernacular languages. With regard to the wealthier classes, it was declared that the time had arrived for the establishment of universities, conferring degrees, and based on the model of the Univ. of London: they were not to be places of education, but to test the value of education obtained elsewhere, and to confer degrees in arts, law, medicine, and civil engineering. Such universities have been established in Calcutta, Madras, and Bombay; and since 1859 govt. schools have been opened for instruction of all classes of the people. In each province there is now a director of public instruction, assisted by school inspectors, one of whom has under his care one circle or subdivision of the province. Normal schools for the training of teachers have been established, and attempts are being made to spread the education of women. In 1905, there were 5 universities, 198 colleges, 112,278 institutions for general education, 1,633 for special training, and 42,627 private institutions.

History.—Before the dawn of history, India seems to have been wholly occupied by non-Aryan peoples in various stages of civilization (see above, *Inhabitants*). The first great epoch in Indian history is the incursion of the Aryan race, and their gradual settlement in the Punjab and the Northwest. Gradually they spread across the great river-belt s. of the Himalayas, the basins of the Indus and the Ganges; and this became the peculiar home of the Aryans, and the scene where their civilization was worked out (see ARYANS). This period is represented by the earliest Indian literature (see above,

Religion). Then came action and reaction between the Hindu and the aboriginal civilization, faith and manners. To B.C. 6th c. are referred the rise of Buddhism (see BUDDHA) and the establishment of Buddhist kingdoms; but Buddhism gradually disappeared about the 12th c., yielding to modern Hinduism. The Mohammedan invasions mark the period 1000 to 1765; the last period is that of the English supremacy.

The oldest history of India is entirely legendary; it is shrouded in mythical narratives, which, though of high interest, in a religious and archæological view, do not enlighten us as to the dates of the personages concerned, nor as to the *reality* of the facts which they record. Thus, the solar and lunar dynasties spoken of in the epic poems, the *Râmâyana* and *Mahâbhârata*, and others mentioned in the *Purânas*, are beyond the reach of history. The first reliable date in ancient Hindu history is that of *Chandragupta*, whom the Greeks call *Sandrocottus;* he reigned about B.C. 300. To the same dynasty belonged the king *Asôka*, prominent in Buddhist history after his conversion, about B.C. 244.

The first Mohammedan dynasty was the *House of Ghizni* (1001-1167). The Sultan Mahmûd, sovereign of the small state of Ghizni (q.v.), was the first conqueror who permanently established the Mohammedan power in India. In 1186, the House of Ghizni became extinct, and the Hindu princes fell one by one before a succession of Mohammedan dynasties, whose names and dates are as follow: *Slave Kings of Delhi* (1206-88).—One of these sovereigns, Altmish, who ascended the throne 1211, added the greater part of Hindustan Proper to his dominions; and in his reign the Mongol Genghis Khan devastated the n.e. parts of India. In Balin's reign (about 1284) the Mongols made a second irruption into Hindustan, but were totally defeated by the monarch's eldest son, the heroic Mohammed, who fell in the action. The *Khiljis and House of Toghlak* (1288-1412).—In 1290, the Mongols made their third and last great irruption into Hindustan, but were almost annihilated by Zafir Khan, whose name became so proverbial among the Mongols, that when their horses started, they would ask them if they saw the ghost of Zafir Khan. In 1397, during the reign of the last of the Toghlak kings, the Tartar Timur, or Tamerlane, sacked Delhi, and proclaimed himself emperor of India. *The Synd* (1412-50). *The House of Lodi* (1450-1526). To the kings of this dynasty succeeded the *Great Moguls or House of Timur* (1526-1707). Baber, who had for 22 years been sovereign of Cabul, invaded India for the fifth time toward the end of 1525 (see BABER), and after doing battle with Sultan Ibrahim on the plain of Paniput, 1526, Apr., entered Delhi in triumph, and established himself emperor of the Mohammedan dominions in India, in right of his ancestor Timur: he died 1530, and was succeeded by his son,

Humayun. The celebrated Akbar (q.v.), son of Humayun, became emperor 1556, and reigned nearly 25 years. His son ascended the throne 1605, and his grandson, Shah Jehan, 1627. In 1658, Shah Jehan was imprisoned by his son, the famous Aurungzebe (q.v.), who usurped the imperial power. This remarkable man raised the Mogul empire to the height of greatness and splendor, and was the ablest and most powerful, as well as the most ambitious and bigoted, of his race. The death of Aurungzebe took place 1707, and the decay of the empire, which had begun a few years before, proceeded rapidly. 'A succession of nominal sovereigns, sunk in indolence and debauchery, sauntered away life in secluded palaces.' Viceroys of the Great Mogul formed their provinces into independent states; while Hindu and Mohammedan adventurers carved out kingdoms with the sword. The dismemberment of the Mogul empire opened a wide field for ambition and enterprise to the nations of Europe. The Venetians, the Genoese, the Portuguese, and the Dutch had by turns traded with India; and 1602, the English appeared on the scene. See EAST INDIA COMPANY.

In 1653, Madras was raised into a presidency, and 1668, the island of Bombay—the dowry of Charles II.'s queen, the Infanta Catherine of Portugal—was transferred by the crown to the E. India Company. The invasion of the Persian, Nadir Shah, 1738, who sacked Delhi, slaughtered its inhabitants, and carried away the Peacock Throne, and vast treasure, hastened the fall of the Mogul empire.

1745-61.—Great jealousy existed between the English and French, who also had established themselves in India. On the declaration of war between England and France, hostilities began in the Madras presidency, nor were they terminated by the peace of Aix-la-Chapelle, 1748. The struggle in the Carnatic was continued with ardor, under pretext of supporting the claims of rival native princes to sovereignty. Clive (q.v.), first and most famous name on that great muster-roll of British soldiers and statesmen who have thrown such lustre on the British occupation of India, laid the foundation of his country's supremacy in the East. His memorable defense of Arcot 1751, and his subsequent victories, broke the spell of French invincibility. The next memorable event was the siege and capture of Calcutta 1756, June 20, by Suraja Dowlah, grandson of Ali Verdi Khan, and gov. or subahdar of Bengal. The English prisoners, 146 in number, were confined in the small garrison prison or Black Hole, of whom only 23 survived till the morning. Clive quickly took command of an expedition fitted out at Madras, recovered Calcutta (1757), and, assisted by Admiral Watson, prosecuted the war with his usual vigor, till after a hollow peace and a renewal of hostilities, Suraja Dowlah was completely defeated by Clive in the memorable battle of Plassey 1757, June 23. Meer Jaffir, Suraja

Dowlah's commander-in-chief, was placed on the musnud by the English, who from this time ruled Bengal as well as Bahar and Orissa.

Political Progress of E. India Company (1764-73).—After the battle of Buxar 1764, with Sujah Dowlah, the usurping vizier of Oude, the Mogul emperor, Shah Alum, who had previously been in the power of the defeated Sujah Dowlah, claimed the protection of the British. He confirmed the company in their possessions, and granted them the collectorate or perpetual *dewannee* of Bengal, Bahar, and Orissa, on condition of receiving the sum of £260,000 per annum. During the subsequent financial difficulties of the company, they repudiated this and other conditions which they had guaranteed to Shah Alum; and the cost to the company of maintaining their authority and standing army prevented them from undertaking public works and developing the resources of the country. The Regulating Act was passed 1773, and a gov.gen. was appointed. In 1765, Clive purged the Indian govt. of oppression, extortion, and corruption, and from that, his last visit, dates the purity of the administration of the British eastern empire.

Administration of Warren Hastings (1773-85).—Warren Hastings was the first gov.gen. of India. A new power, the Supreme Court of Judicature, appointed by the Regulating Act, came into operation during his administration. This council arrogated to itself authority exceedingly embarrassing to the gov.gen., to whom it was very hostile. Hastings used unscrupulous, and at times utterly unjustifiable means to replenish the E. India Company's exchequer, but, by his energy and talent, he averted dangers that threatened to annihilate British supremacy in India. The powerful Mussulman sovereigns, Hyder Ali and the Nizam of the Deccan, assisted by French officers, combined with the Mahrattas against the English; Sir Eyre Coote broke up the confederacy, and defeated Hyder Ali 1781. In 1782, the Supreme Court of Judicature was deprived of its independent powers, and the policy of Hastings was successful both in the council and in the field. In 1784, Pitt instituted the Board of Control.

Marquis Cornwallis (1786-93).—Lord Cornwallis, who succeeded Warren Hastings, was both gov.gen. and commander-in-chief. His administrative measures were important, and consisted most notably in fixing the land-rent throughout Bengal on that system of land tenure known as Zemindari, and reforming the judicial system. In 1790, Lord Cornwallis, with the Nizam, the Mahrattas, and the Rajah of Coorg for allies, made war on Tippoo, Sultan of Mysore, who had invaded Travancore, then under British protection. Terms were dictated to Tippoo at his capital, Seringapatam, and he was compelled to cede half his dominions to the company.—The Marquis

Cornwallis was succeeded by Sir John Shore (1793-98), whose rule was in no respect memorable.

Marquis Wellesley (1798-1805).—The British empire in the East, like that of Napoleon I. in Europe, could be maintained only by constant fighting; fighting was the price paid for empire, and to stand still was to retrograde. Tippoo Sahib broke his faith by intriguing against the English both with the French and with native princes: his bad faith cost him his crown and his life. In 1799, May, Seringapatam was captured, and Tippoo slain. The Hindu dynasty, displaced by Hyder Ali, was restored, and the administration carried on most successfully for the youthful rajah by Col. Wellesley (afterward Duke of Wellington). In the famous battle of Assaye, 1803, he defeated the Mahrattas under Scindia; and the victories of Lord Lake in northern India extended considerably the dominions of the company. The policy of the Marquis Wellesley was, however, too aggressive to suit the views of the E. India Company, and he was superseded by Lord Cornwallis, who returned to India only to die. Lord Minto succeeded 1806-13.

Nothing of much importance occurred until the Marquis of Hastings became gov.gen. (1813-23). He waged war against the Pindaris, who were entirely suppressed. He had previously defeated the Gurkhas; and before the close of his brilliant administration he made the British power supreme in India. The civil administration of the Marquis of Hastings was directed to the amelioration of the moral condition of the people of India.

The next administrations were those of Earl Amherst and Lord William Bentinck. The first was signalized by the Burmese war, the second by the suppression of sutti and the Thugs.

Earl of Auckland (1835-42).—This gov.gen. is known chiefly by his unjustifiable and disastrous Afghan policy, ending in the horrible massacre of British troops in the Khyber Pass. See AFGHANISTAN.

Earl of Ellenborough (1842-44).—The 'army of retribution' proceeded to Cabul soon after Lord Ellenborough took the reins of government. Cabul was sacked, several public buildings razed to the ground, after which the country was evacuated. The conquest of Sinde by Sir Charles Napier, followed by its annexation, also belongs to this administration.

Sir Henry Hardinge (1844-48).—Lord Ellenborough having been recalled by the E. India directors, from alarm at his martial tendencies, Sir Henry Hardine was sent to take his place. The attention of the new gov.gen. was, however, soon diverted from works of peace to do battle with the bravest people of India. Ever since the death of the British ally, Runjeet Singh, 1839, the Punjab had been in a state of disorganization. The Sikhs, uneasy at British conquests in Sinde and Gwalior, and remembering British discomfiture at Cabul and the Khy-

ber, resolved to anticipate the attack that they considered imminent. The first Sikh war began on the part of the Punjabees by the passage of the Sutlej, and was followed by the terrible battles of Moodkee, Ferozeshah, Aliwal, and Sobraon, in which, after very hard fighting, the Sikhs were defeated with great slaughter. The war resulted in a British resident and British troops being stationed at Lahore, though the boy prince, Dhuleep Singh, was acknowledged as Maharajah. The Cis-Sutlej states, the Jullundur Doab, and the alpine region between the Beas and the Sutlej were annexed.

Marquis of Dalhousie (1848-55).—This administration is memorable for the commencement of superb public works, cheap uniform postage, railways, telegraphs, improvements in government, and social progress generally; a second Sikh war (ending in the crowning victory of Gujerat, 1849, Feb. 21), a second Burman war (finished 1852); and the annexation of four kingdoms, the Punjab, Pegu, Nagpûr, and Oude.

Viscount Canning (1856-62).—When Lord Canning took the reins of government, everything promised peace and prosperity. With the early days of 1857 came the first mutterings of the storm that was to sweep over so large a portion of British India. At the commencement of the year, chupattees (cakes of flour and water) were circulated mysteriously through the N.W. Provinces; treasonable placards appeared at Delhi, and other suspicious occurrences gave warning of Mohammedan disaffection or conspiracy. The Enfield rifle and its greased cartridge was at this time put into the hands of the sepoys without explanation or precaution; and Gen. Anson, commander-in-chief, snubbed caste, and was against all concession to the 'beastly prejudices' of the natives. The mutiny broke out at Meerut (32 m. from Delhi), where there were stationed European troops amounting to about 1,800 men, besides sappers and miners, and about 2,900 native soldiers. Apr. 23, the skirmishers of the 3d native cavalry, on parade, refused to touch the new cartridges, though permission was given to break off the end with the fingers. The 85 mutineers were tried, and sentenced to imprisonment. On the evening of the day after the sentence, the native troops rose, liberated their comrades and the felons of the jail, shot down their officers, and the doomed station was given up to conflagration and massacre. The next day, May 11, the Meerut mutineers reached Delhi. There were no European troops to oppose them, and the city fell into their hands, but was retaken by Gen. Archdale Wilson the following September. Nana Sahib of Bithoor, whose claims as the adopted son of the Pishwah had not been recognized by the British govt., fanned the insurrection. At the end of June, Gen. Wheeler was forced to surrender to him at Cawnpore, and, in spite of the promise of safe conduct to Allahabad, all the men were immediately massacred. The

women were butchered July 15, by order of the Nana, when he heard of Havelock's march from Allahabad, which had begun July 7. The Europeans in the Residency at Lucknow were besieged June 30. Five days afterward, the commandant, Sir Henry Lawrence, died of his wounds, and his place was taken by Brigadier Inglis, who bravely held out till he was relieved on Sep. 25 by the heroic Havelock. The final relief was achieved by Sir Colin Campbell; and the city was again in complete possession of the British. By 1858, June, no city or fortress of any importance remained in the hands of the mutineers. Oude was entirely reduced by the beginning of 1859. The able rebel leader, Tantia Topee, a Mahratta Brahman, was taken, tried by court-martial, and hanged. During the mutiny, valuable assistance and protection were received from many native chiefs. Honors were, in consequence, bestowed upon Scindia, the Maharajah of Gwalior; Holkar, Maharajah of Indore; the Nizam, and others. The trial of the king of Delhi resulted in his conviction as 'a false traitor to the British government, and an accessory to the massacre in the palace.' It was the fate of the last representative of the E. India Company to sentence the last Great Mogul and heir of the House of Timûr 'to be transported across the seas as a felon.' He was transported accordingly, accompanied by his queen and son, to Tongu, in Pegu, where he died 1862. The transfer of the govt. of India to the British crown, and the new constitution above referred to, were the immediate consequences of the mutiny.

The Earl of Elgin (1862-63).—No event of importance occurred during the brief administration of Gov. Gen. Lord Elgin, who died 1863, Nov.

Sir John Lawrence (1863-65).—Toward the close of Lord Elgin's administration, a Mohammedan rising was apprehended in n.w. India, and it was considered most desirable that the new viceroy should have practical experience of Indian affairs. Sir John, afterward Lord Lawrence, was accordingly appointed viceroy. He conducted the govt. with great prudence and zeal; though unfortunate events occurred during his term of office. A war with Bhotan terminated unsatisfactorily for England 1865; and a dreadful famine occurred in Orissa, caused by a drought and failure of the crops, by which one million and a half of people perished.

Earl Mayo (1863-72).—This administration was inaugurated by a great demonstration at Umballa 1869, Mar. 27, when the Ameer of Afghanistan was received in state, and received a supply of arms and the first instalment of a money subsidy of £120,000 a year. In returning from Rangoon to Calcutta, Lord Mayo visited a convict establishment in the Andaman Islands, and was assassinated there by one of the prisoners, 1872, Feb.: the act had no political significance.

Baron Northbrook (1872).—The chief events of this

administration were 'the Bengal famine,' which, however, was anticipated in good time; and the visit of the Prince of Wales to India (1875).

Baron Lytton (1876).—During Lord Lytton's term of office the queen was proclaimed Empress of India (1877), another famine was relieved, and native Indian troops were dispatched to Malta during the Russo-Turkish war 1877-8. An Afghan War began 1878, was interrupted by the peace of Gandamak 1879, and recommenced in Sep., when the new English resident at Cabul was murdered, with his suite.

The Marquis of Ripon (1880-84).—The formation of a liberal ministry led to the resignation of Lord Lytton. After an English defeat in the Afghan war, and one decisive English victory near Candahar, and several smaller English successes, the war was ended, and the troops withdrawn. A contingent of the native Indian army did admirable service in Egypt in the war of 1882; and some of them afterward visited England. Several administrative measures were proposed or passed, which conferred privileges on the natives of India in connection with public appointments and otherwise. Most of these were very unfavorably received by Anglo-Indians, and some were much modified, others withdrawn; but they secured great popularity for the viceroy amongst the natives.

Lord Dufferin (1884-88).—Lord Ripon was succeeded 1884, Sept., by Lord Dufferin. The chief events during his administration were the third Burmese war, the annexation of Upper Burmah with the Shan States 1886, Jan. 4, and the defining and strengthening of the 'Scientific Frontier.'

Marquis of Lansdowne (1888-93).—Chief events were the strengthening of the army and defenses of India, currency reform, closing free coinage of silver, and reconstruction of the provinces.

Earl of Elgin (1893-98).—Northwest frontier strengthened, famine, plague and cholera 1895, earthquake in Anam 1897, frontier war and celebration of Queen-Empress.

Viscount Curzon (1899-1905).—Troops despatched to South Africa 1899, and to China 1900, disastrous famine, King Edward proclaimed Emperor at Delhi 1903, Jan. 1; political minister to Tibet 1904, several earthquakes 1905, April. Period of reform and reconstruction.

Earl of Minto (1905-).—Creation of new province (1905) from divisions of Bengal and Assam. New Province entitled Eastern Bengal and Assam.

Books on India.—Dr. W. W. Hunter's *Imperial Gazetteer of India* (9 vols. 1881); James Mill's *History of British India* (1858); J. Talboys Wheeler's *History of India*, or his *Short History* (1880); Lassen's *Indische Alterthumskunde;* works of Elphinstone, Elliot, and Meadows Taylor; Adye, *Indian Frontier Policy* (1897);

Baden-Powell, *Land Systems of British India* (1892); Balfour, *The Cyclopædia of India* (1885); Birdwood, *The Industrial Arts of India* (1887); Boulger, *India in the 19th Century* (1901); Chesney, *Indian Polity* (1894); Chevrillon, *Romantic India* (1897); Cunningham, *British India and its Rulers* (1881); Dubois, *Hindu Manners, Customs and Ceremonies* (1897); Dutt, *Economic History of British India* (1900); Elliott, *History of India* (1869); Hunter, *The Indian Empire* (1893); Kaye, *The Administration of the East India Company* (1853); Keene, *History of India* (1893); Lee-Warner, *The Protected Princes of India* (1894); Lilly, *India and its Problems* (1902); Malleson, *History of the Indian Mutiny* (1897); Morison, *Imperial Rule in India* (1899); Rousselet, *India and its Native Princes* (1876); Sherring, *History of Protestant Missions in India* (1884); Strachey, *India* (1888); Tupper, *Our Indian Empire* (1893). The Afghan War and the Indian Mutiny have been treated by Sir John Kaye. Cunningham has written a history of the Sikhs, and Grant Duff of the Mahrattas. There is much valuable information on India and things Indian in Dalton's *Ethnology of Bengal;* in the various works of Dr. W. W. Hunter; in reports on the *Moral and Material Progress of India,* and other official blue-books. See also *History of the French in India* (1868), by Col. Malleson; *England's Work in India,* by W. W. Hunter; *India in 1880,* by Sir R. Temple; *History of the Indian Mutiny,* by T. R. C. Holmes (1884). See also the Statesman's Year Book (London 1907), where an exhaustive bibliography is given.

IN'DIA, FRENCH: comprising nearly 200 sq. m.; pop. (1901) 273,000. The settlements are Pondicherry (the largest), Karikal, and Yanaon, on the e. coast, Mahé on the w. coast, and Chandernagore on the Hooghly.

IN'DIA, NATIVE STATES OF: allied, tributary, and protected states in India, holding various relations to the British government. Two are, nominally at least, entirely independent of British control or interference; these are Nepaul and Bhotan, both on the slopes of the Himalaya. Though not maintaining any direct relations with the British Government of India, they are of course dependent in large measure on British power and forbearance. Cashmere is independent in all that concerns its internal management; but its relations to other states are directly under British control. Sikkim and Garhwal also are semi-independent. When the native states of India are spoken of, as a rule the feudatory states are meant; and only the latter appear in the official tables.

Native States more or less under British Control.	English sq. m.	Population, 1901.
Hyderabad	82,698	11,141,142
Baroda	8,099	1,952,692
Mysore	29,444	5,539,399
Kashmir	80,900	2,905,578
Rajputana	127,541	9,723,301

Central India	78,772	8,628,781
Bombay States	65,761	6,908,648
Madras States	9,969	4,188,086
Central Prov. States	29,435	1,996,383
Bengal States	38,652	3,748,544
N. W. P. States	5,079	802,097
Punjab States	36,532	161,118
Baluchistan	86,511	.....
Total	679,393	62,461,549

The native states recognizing English supremacy, occupy more than a third of the area over which Britain is supreme, and contain more than one-fifth of its entire population. In the above table they are thus grouped by their connection with the British administration.

The relations of their princes to British authority differ very widely. Some are practically independent sovereigns, except that the suzerain power does not permit any of them to make war on one another, or to form alliances with foreign states; while some are under strict control. All govern their states under the advice of an English resident, appointed by the gov.-general. The authority of all the native princes is limited by treaties with the British govt.; and the latter rebukes, and if need be, removes a prince who misgoverns. There are in all about 300 feudatory states, great and small; and divided into allied (with 20,000,000 inhabitants), tributary (about 50 with 12,000,000), and protected (about ninety with 18,000,000).

Seven of the eight large provinces have a number of natives states attached to them. Attached to Bengal, with an area of 35,834 square miles, and a population in 1901 of 3,735,715, are the individual states of Orissa, Chota Nagpur, Kuch Behar, and Hill Tipperah; to the United Provinces of Agra and Oude, with an area of 5,109 square miles, pop. 799,675, are Rampur and Garhwal; to the Panjab, with an area of 38,299 square miles, pop. 4,438,816—the chief states are Patiala, Bahawalpur, Kapurthala, Jind, and Nabha; to Madras, area 9,609 square miles, pop. 4,190,322—the chief states are Travancore and Cochin; to Bombay, area 69,045 square miles, pop. 6,891,691—the chief states are the Kathiawar group, Kolhapur, Rewa Kantha, Palanpur, Mahi Kantha, Cutch, and Khairpur (Sind); to Central Provinces, 29,435 square miles, pop. 1,983,496—the chief states are Patna, Kalchandi, Bastai, Bamra, and Raigarh.

The feudatory states (excluding the frontier states except Kashmír, and without counting small states with an aggregate of about 1,000,000 inhabitants, which have no armies) have together armed forces amounting to 350,000 men, and 4,300 guns. Not more than one-eighth of the Mohammedans of India live in the native states, the vast majority being under direct English rule; and of the inhabitants of the native states not one-third are Moslems. (See respective titles of the states.)

IN'DIA, Portuguese: comprising 1,450 sq. m.; pop.

420,000. By far the largest settlement is Goa (q.v.); the others being Daman, n. of Bombay, and Diu in Kattywar.

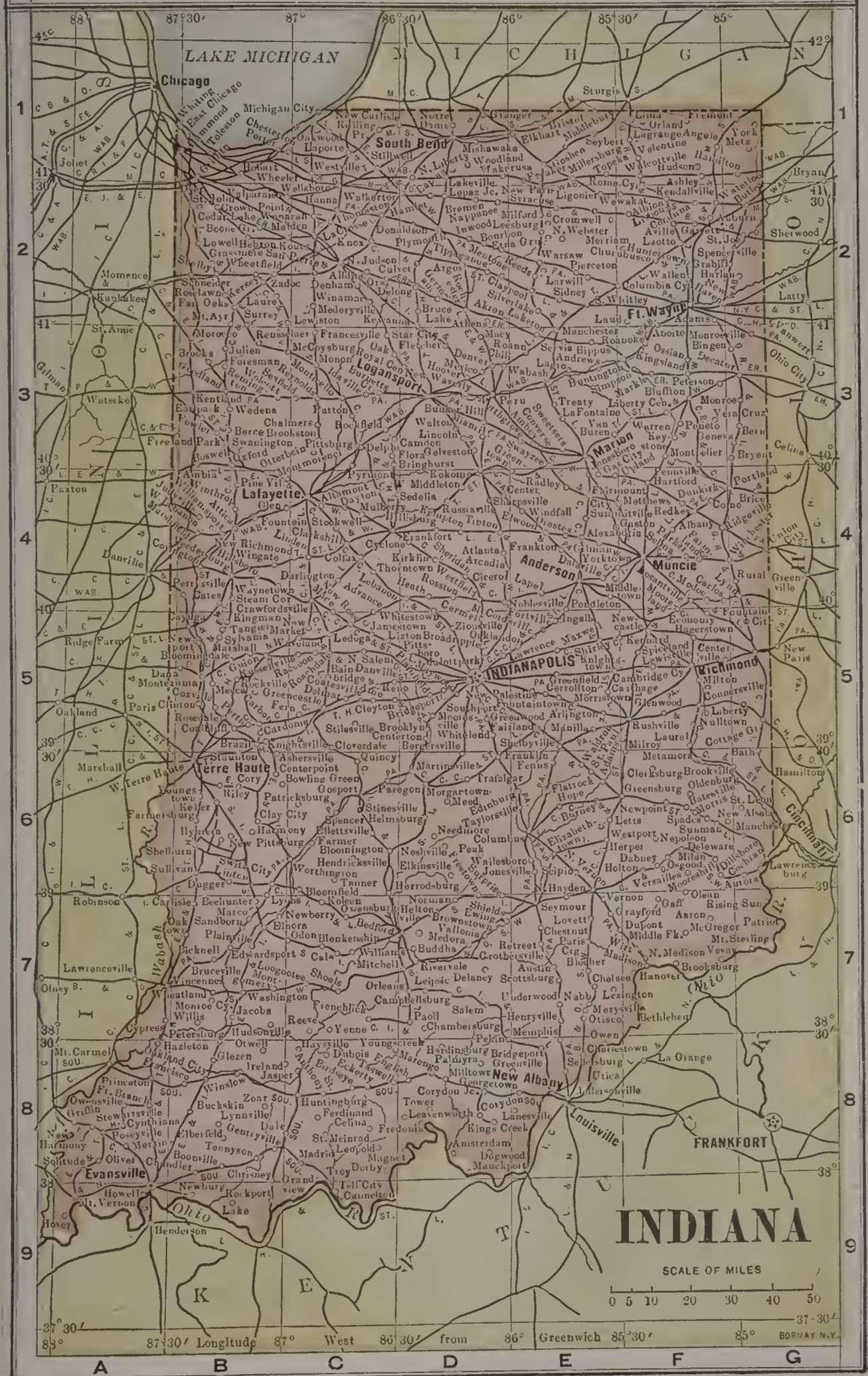
IN'DIA INK, or IN'DIAN INK: mechanical mixture, and not like the true inks, a chemical compound. The usual basis for this ink is an exceedingly finely divided solid carbon, mixed with a size to hold it in suspension when the ink is prepared for use by being ground up with water. A little camphor (about 2 per cent.) also is found in the ink made in China, and is thought to improve it. This substance is used in that country with a brush both for writing and for painting on paper of native manufacture, while, in w. Europe and the United States, it is extensively used for designs in black and white, and all intermediate shades of color.

INDIAN, a. *ĭnd'yan* or *ĭn'dĭ-ăn* [*India,* name of a country: *Indus,* name of a river in India]: pertaining to the Indies, E. or W.: n. a native of India; a Hindu. INDIAN, or RED INDIAN, an aboriginal inhabitant of N. Amer.—so named because Columbus, when he discovered Amer., thought he had reached India. IN'DIA, a. *-dĭ-ă,* of or belonging to India: n. the country. INDIES, n. plu. *ĭn'dĭz,* when applied to Hindustan the name employed is *East Indies;* when applied to Jamaica and the islands in the same seas the name employed is *West Indies,* or *W. India Islands* (see EAST INDIES: WEST INDIES). INDIA-RUBBER, an elastic gum obtained from certain trees, called also *caoutchouc*—which see. IN'DIAMAN, n. a large ship trading to India. INDIAN ARMY: see EAST INDIA ARMY. INDIAN BERRY, a plant, the *Coc'cŭlŭs indĭcus*—which see. INDIAN FIG: see PRICKLY PEAR. INDIAN FIRE, a bright white signal light produced by burning a mixture of 7 parts of sulphur, 2 of realgar (q.v.), and 24 of nitre. INDIAN HEMP: see HEMP, INDIAN: HASHISH. INDIAN PAPER, a delicate absorbent paper, used to take first or finest proofs of engravings. INDIAN RED, a kind of ochre imported from the Persian Gulf, chiefly in small lumps, of a deep red color with a shade of purple. INDIAN SUMMER, in *N. Amer.,* a brief period of warm pleasant weather occurring late in autumn. *Note.*—INDIAN was formerly applied to almost all savage people except negroes.

INDIAN RIVER: tidal channel of Fla., in Brevard and Volusia cos., parallel with the Atlantic coast and for the most part ½ m. from it; 100 m. long, variable in width, usually very narrow, but in places expanded into considerable lakes, is connected by a canal with Halifax river and by Indian River Inlet with the ocean; and is continued s. of Jupiter Inlet as St. Lucie Sound. It is navigable, flows through a beautiful and healthful region, and is highly esteemed as a resort for invalids and sportsmen.

INDIANA, *ĭn-dĭ-ăn'a:* a state; one of the U. S. of America, in the n. central group; 6th in order of admis-

Area in Square Miles, 36,350. Population, 2,516,462.
Number of Counties, 92. Capital of State, Indianapolis.



sion into the Union, and among the most important in the production of corn, wheat, swine, steel and pig-iron; popularly known as the 'Hoosier State.'

Location and Area.—Indiana is in lat. 37° 47′—41° 50′ n., long. 84° 49′—88° 2′ w.; is bounded on the n. by Mich. and Lake Michigan, e. by O., s. by Ky., w. by Ill.; extreme length 276 m., extreme breadth 176 m., average breadth 140 m.; extreme altitude 1,250 ft., lowest 300 ft., average 735 ft.; lake coast line 60 m.; 36,350 sq. m. (23,264,000 acres); cap. Indianapolis.

Topography.—The surface has a gradual slope from the n.e., where the elevation is about 1,100 ft., to the s.w., where it is 300 ft., reaching its extreme elevation near the O. boundary about midway between Mich. and Ky. In the n.w. and s.e. the elevation is nearly the same, about 500 ft., and in the s.w. it reaches its lowest point, about 300 ft. A large proportion of the surface, especially in the w. and n.w., is level prairie. Sandhills occur in the n.; broken and elevated tracts along the Wabash and Ohio rivers; and fine table-lands in the region e. and n. of the river hills. The entire s. boundary is formed by the Ohio river, which receives the greater portion of the streams of the state, including the Wabash, White, and White Water rivers, and has an irregular course along the border of 380 m. The Wabash rises in O., traverses the state from n.e. to s.w., forms more than a third of the w. boundary, has a course in the state of 600 m., and its valley with those of its affluents covers an area of more than 12,000 sq. m. The Maumee is formed by the St. Mary's and St. Joseph's rivers in the n.e., drains a valley of 2,000 sq. m., and flows into O. The Kankakee drains 8 cos. in the n.w., flows into the Illinois river in Ill., and has a swampy valley, with sand and barren soil near Lake Michigan. Other principal streams are White river, formed by e. and w. forks, which in turn receive several smaller streams, and White Water river, which drains several cos. in the s.e. The White flows into the Wabash; the White Water into the Great Miami. Thus, a part of the state is drained into the Mississippi by the Kankakee, another part into Lake Michigan, a small part into Lake Erie by the Maumee, and the greater part into the Ohio. The largest inland body of water is Beaver Lake, in Newton co., which has an area of 10,000 acres; but Noble, Kosciusko, Stark, Marshall, La Porte, and Knox cos. contain many small lakes.

Geology.—The geological formations of the state comprise drift in the n. portion; Silurian, extending in a belt across the state from e. to w. and reappearing in the n.w.; Devonian, exposed from the Ohio river near New Albany to White co. in the n.w.; Subcarboniferous, carrying sandstone and limestone, w. of the Devonian; and the coal measures in the upper half of w. counties. The best agricultural lands are in the valleys of the Wabash, White, and White Water rivers; a third of the

surface is covered with choice timber; and the coal measures, yielding cannel, block, and free-burning bituminous, all easily mined, cover an area of more than 7,000 sq. m. The forests contain black walnut, red, white, black, and burr oak, red and sugar maple, hickory, ash, beech, sycamore, elm, linden, whitewood, and some pine, spruce, and hemlock. Petroleum is abundant in Adams, Blackford, Grant, Jay, and Wells cos., in the e. part; and Blackford, Delaware, Grant, Hamilton, Hancock, Henry, Madison, and Tipton, with portions of adjoining cos., comprise the natural gas area, in all about 5,000 sq. m.

Climate.—The annual range of temperature is from 48° in the n. to 56° in the s., with an annual average for the state of 52°. The rain-fall ranges from 36 in. in the n. to 46 in. in the s., with annual average for the state of 42 in. At Indianapolis, the mean winter temperature is 28°, with extreme -25°; mean summer 76°, extreme 101°; and average annual rain-fall, 44.4 in.

Agriculture.—There are more than 225,000 farms in the S., comprising about 25,000,000 acres, the greater part of which is improved land. The principal crops are corn, wheat, oats, barley, rye, buckwheat, potatoes, hay, and tobacco. Farming in the S. is carried on in accordance with the most improved and up-to-date methods. The total value of all farm property, including lands and improvements, machinery and implements, and live stock is approximately $1,000,000,000.

Manufactures.—The leading manufacturing industries are flour and grist mills, slaughtering and meat packing, foundry and machine-shop products, liquors, iron and steel, carriages and wagons, glass, lumber and timber products, railroad cars, general shop construction, repairs, etc., and furniture. The total manufacturing output of the S. is worth considerably over $250,000,000 a year, there being altogether upwards of 8,000 manufacturing establishments in the State.

Minerals and Mining.—About one-fifth of the surface of I. is underlaid by coal, workable veins having been found in about 20 counties. There are at least 7 distinct veins of workable thickness, varying from 3 to 11 feet. The coals of the S. are of two classes: (1) caking, or bituminous; and (2) non-caking, or block coal. The latter can be burned in blast furnaces without coking. The annual production of bituminous coal is in excess of 10,000,000 tons, and about 15,000 persons are employed in the coal-mining industry. Next to coal, petroleum is the most valuable mineral product, several million barrels being produced each year. The oil industry is a comparatively new one in I., but its enormous growth has been remarkable. I. ranks well up to the front among the States in the production of building stone, being particularly rich in limestone, especially of the cheaper varieties, such as blue Devonian, gray Niagara, and oolitic—the latter having

attained a justly merited national recognition. There is also a large production of cement and lime, while the presence of good clay makes brick and tile making extensive industries. Kaolin and glass sand are profitably mined in several counties, and throughout a large portion of the State natural gas has been found by sinking wells. At one time the supply of natural gas reached a daily flow of 900,000,000 cubic feet, but latterly the pressure has been decreasing and in many places its cessation has given place to a flow of petroleum. Many other minerals have been found in I., but not in sufficient quantities to be of commercial importance.

Commerce.—The two principal ports of entry are Evansville and Indianapolis, the annual imports of these two cities amounting to more than $400,000. The State also has an extensive domestic trade.

Transportation.—Beginning in 1847 the railway system of I. has developed rapidly until there are now nearly 7,500 miles of track in the State. These are divided among numerous different lines, the principal terminus being Indianapolis, from which about 15 roads radiate, being connected outside the city by a belt railway. There are street railways in all the cities and larger towns, their total mileage aggregating almost 2,000 miles. The old Wab. and Erie and the White Water canals have been abandoned.

Finances and Banking.—The bonded debt of I. is $1,510,163, the total assessed valuation of property $1,766,132,096, and the tax rate $3.33 per $1,000. There are also taxes for sinking fund, for general State government, for benevolent institutions, for State tuition, for State institutions of higher education, together with a poll tax. There are over 225 national banks and about the same number of both State and private banks. Savings banks are few, and loan and trust companies of minor occurrence, but the building and loan associations have attained great importance and number nearly 400. Clearing-house organizations are conducted at Indianapolis, Evansville, Fort Wayne, and South Bend.

Religion.—The chief denominations in the State are the Methodist, Roman Catholic, Disciples or Christians, Baptists, Presbyterians, United Brethren, Lutheran, and Friends, although practically all denominations are represented to some extent.

Education.—There are about 550,000 children enrolled in the public schools of I., with about 17,000 teachers. There are also schools of technology, law, medicine, and theology, normal schools, and colleges and universities, both co-educational and for men only. Among the institutions of higher education which receive aid from the State are the I. University, State Normal School, and Purdue University. There are numerous other in-

stitutions of higher education, probably the most prominent besides those above mentioned being the Catholic University, Notre Dame, De Pauw University, and the Rose Polytechnic Institute.

Charitable and Reformatory Institutions.—These include the State Hospitals for the Insane at Indianapolis, Evansville, Richmond, and Logansport; School for Feeble-minded Youth at Fort Wayne; School for the Deaf and Dumb at Indianapolis; Institution for the Blind at Indianapolis; Reform School for Boys at Plainfield; Reformatory for Women and Girls at Indianapolis; State Prison for Men at Michigan City and Jeffersonville; a Soldiers' and Sailors' Orphans' Home at Knightstown, and a Soldiers' Home at Lafayette. In addition to the State institutions each county maintains a poor asylum. There are in the State 46 orphans' homes.

History.—In its earliest history, Indiana greatly resembles Ill. (q.v.). The territory now included within its limits was owned and occupied by the Miami Confederacy of Indians. From the discoveries of Marquette 1673 and La Salle 1680-2, the French claimed possession till 1765, when the region passed to the British crown through the Treaty of Paris. In this interval a number of French colonies were established at Vincennes, Corydon, and elsewhere, trading posts were opened, and alliances of friendship made with the Indians. Under the British Indiana was formerly made a part of the province of Virginia, and this relation existed officially till 1784, when by the treaty of peace between the United States and Great Britain, 1783, and the deed of cession executed by Virginia, 1784, it became a possession of the United States, and 1787 was made a part of the vast tract known as the Northwest Territory, and comprising the present Indiana, Illinois, Wisconsin, Michigan, part of Minnesota, and, after the purchase of Louisiana from the French (1803), the unknown regions w. of the Mississippi river. Its contribution to the history of the revolutionary war was the capture of the British post of Vincennes by the Americans under Gen. George Rogers Clarke, 1778, July 4. Two years afterward war broke out between the whites and the confederated Indian tribes, and was spiritedly waged in Vincennes and its vicinity till 1791, when Gens. Wilkinson and Wayne defeated them at the mouth of the Tippecanoe, and forced them into submission. After 4 years of peace the government secured a large tract of valuable land by the treaty of Greenville, and under liberal inducements a large immigration set in from the e. states. In 1800 Ohio was detached and erected into a separate territory, and all the region in the Northwest Territory n. and w. of it was organized as the Territory of Indiana. In 1805 Michigan was set off as a separate territory; 1809, Illinois; leaving Indiana Territory as at present limited.

The first territorial governor appointed was Gen. Will-

STATE CAPITOL AT INDIANAPOLIS.

iam Henry Harrison (q.v.), who had served through the Indian war and subsequently became pres., and the pop. of that part of the territory now comprised within the limits of the state was 4,875. By 1810 the pop. had increased to 24,520, and the territory was prosperous. In the following year the Indians were excited to war by Tecumseh, the Shawnee chief, and his brother the Shawnee prophet. The Indians raided the settlements of the whites and carried off large quantities of their property. Governor Harrison forbade traders selling whiskey to the Indians within a mile of Vincennes, or across the Wabash, in July; and as the Indian raids continued, he raised a body of regular and volunteer troops, marched to Prophetstown, demanded a surrender of the stolen property, was promised compliance the following day, and during the night (Nov. 6-7) was suddenly attacked by the Indians though an armistice had been granted. The troops, guarded against surprise, turned out promptly, and after a bloody struggle at Tippecanoe, forced the Indians to flight. General Harrison lost 307 killed and had 151 wounded, and the Indians lost in killed 308. This battle destroyed the influence of Tecumseh and his brother over the Indians, broke up their confederacy, and brought a much needed though temporary relief from depredation to the frontier settlements. In the early part of the war with Great Britain (1812), the Indians renewed hostilities, but they were again subdued, and since 1815 Indiana has been wholly free from trouble from that source.

The first movement toward statehood was made immediately after the Tippecanoe campaign when a memorial was sent to congress, but the war with Great Britain and the appointment of Gov. Harrison to command the northwest army caused a postponement of action. In 1815, Dec., the petition to congress was renewed; 1816, Jan., a bill to admit the territory as a state was reported; Apr. 19 it was passed; June 29 the first constitution was adopted; and Dec. 11 Indiana was admitted into the Union. The new state grew rapidly in population and material wealth; more than 3,500,000 acres of govt. land within its limits were purchased in 10 years, 1820-1830; enterprise and speculation ran side by side; and 1837 there resulted a general bankruptcy of people and state govt. The state debt was increased to $14,057,000, and it was not till 1846 that the state was able to resume interest payments. With this event, the completion of the Erie and Wabash canal, the extension of the railroad system, and the passage of the free banking law Indiana started on a new era of prosperity. The state constitution was revised 1851, and an attempt to adopt a third one 1859 failed. During the civil war Indiana furnished 197,147 troops to the Union armies.

Government.—The executive authority is vested by the

constitution in a governor, elected for 4 years, salary $8,000 per annum; the legislative in a general assembly comprising a senate of 50 members elected for 4 years, and a house of representatives of 100 members elected for 2 years, salary of each, $6 per day and 20c. mileage, biennial sessions in the odd years; and the judicial in supreme, circuit, and superior courts. Supreme court judges are elected for 6 years, circuit 6, and superior 4. Other state officials are the lieutenant-governor, secretary of state, treasurer, auditor, and attorney-general.

The successive governors with their terms of service are as follows:

TERRITORY.

William H. Harrison	1800-11	Thomas Posey	1813-16
John Gibson (act'g)	1811-13		

STATE.

Jonathan Jennings	1816-22	Conrad Baker	1867-73
William Hendricks	1822-25	Thomas A. Hendricks	1873-77
James B. Ray	1825-31	James D. Williams	1877-81
Noah Noble	1831-37	Albert G. Porter	1881-85
David Wallace	1837-40	Isaac P. Gray	1885-89
Samuel Bigger	1840-43	Alvin P. Hovey	1889-91
James Whitcomb	1843-48	Ira J. Chase	1891-93
Paris C. Dunning	1848-49	Claude Mathews	1893-97
Joseph A. Wright	1849-57	James A. Mount	1897-1901
Ashbel P. Willard	1857-61	Winfield T. Durbin	1901-05
Oliver P. Morton	1861-67	J. F. Hanly	1905-

Counties, Cities and Towns.—It is divided into 92 counties. In 1900 Indianapolis had a pop. of 169,164, Evansville 59,007, Fort Wayne 45,115, Terre Haute 36,-673, South Bend 35,999, New Albany 20,628, Richmond, 18,226, Lafayette 18.116, Logansport 16,204, Elkhart 15,184, Muncie 20,942, Michigan City 14,850, Anderson 20,178, Jeffersonville 10,774, Madison 7,835, Vincennes 10,249.

Politics.—State, congressional, and presidential elections are held on Tuesday after the first Monday in Nov. Citizens of the U. S. and aliens who have declared intention, and resided in U. S. 1 year, in state 6 mo., and in town and precinct 30 days, can vote. Criminals, bribers, and fraudulent voters are excluded from voting. Her vote for president and vice-president has been as follows: 1816 and 1820, Monroe and Tompkins 3; 1824 and 1828, Jackson and Calhoun 5; 1832, Jackson and Van Buren 9; 1836, Harrison and Granger 9; 1840, Harrison and Tyler 9; 1844, Polk and Dallas 12; 1848, Cass and Butler 12; 1852, Pierce and King 13; 1856, Buchanan and Breckenridge 13; 1860, Lincoln and Hamlin 13; 1864, Lincoln and Johnson 13; 1868, Grant and Colfax 13; 1872, Grant and Wilson 15; 1876, Tilden and Hendricks 15; 1880, Garfield and Arthur 15; 1884, Cleveland and Hendricks 15; 1888, Harrison and Morton 15; 1892, Cleveland and Stevenson 15; 1896, McKinley and Hobart 15; 1900, McKinley and Roosevelt 15; 1904, Roosevelt and Fairbanks 15.

INDIANAPOLIS.

Population.—(1800) 5,641; (1810) 24,520; (1820) 147,178; (1830) 343,031; (1840) 685,866; (1860) 1,350,428; (1870) 1,660,657; (1880) 1,978,301; (1890) 2,192,404; (1900) 2,516,462; (1910) 2,700,876.

INDIANAPOLIS, *ĭn-dĭ-ăn-ăp′ o-lĭs:* city; cap. of Marion co. and of the state of Ind.; at the confluence of White river and Fall creek; about 184 m. s. e. of Chicago, 283 m. s. w. of Cleveland, and 240 m. n. e. of St. Louis. It is the centre for many lines of railway, chief of which are the Pennsylvania lines west, including its branch lines, the Madison and Jeffersonville, the Vincennes line, the Indiana Central, the Vandalia, etc.; the Big Four System, including the Bellefontaine, the Indianapolis and Cincinnati, the I. and Lafayette, the I., Bloomington and Western, the I. and St. Louis, etc.; the Lake Erie and Western; and others, beside many lines of electric railway.

Surroundings and Plan.—It is on the line of the old national turnpike, in an unusually rich agricultural region, and within a short distance of a natural gas belt, extensive forests of valuable timber, a coal area of 7,000 sq. m., and important iron ore mines. Its exceptional railway facilities make it one of the most noted commercial distributing points in the country. The city is laid out on a plain, with streets from 60 to 100 ft. wide, crossing each other at right angles, and bordered with noble forest trees, and 4 broad avenues running diagonally toward a circular park in the centre of the city, containing a statue of Gov. Oliver P. Morton and a soldiers' and sailors' monument. A belt railway 15½ m. long extends around the city and connects the principal railways. The public park system includes 9 parks of nearly 1,200 acres area. Riverside Park, purchased in 1898, contains 950 acres along White River. Garfield Park 108 acres, and Brookside Park 80 acres. There are also several smaller parks such as Military Park, 14 acres, Spades Place, 8 acres, etc., and several cemeteries, one of which, Crown Hill Cemetery, contains 540 acres.

Notable Buildings.—The most conspicuous building is the Capitol, completed 1888 at a cost of $2,000,000, built of Bedford limestone, with two wings, and a dome 234 ft. high, and Corinthian columns above the basement. The building is 492 ft. long and 185 ft. wide. The Marion County Court house, built of dressed stone, and iron, is 275 ft. long by 130 ft. wide, has a central towner 200 ft. high, and cost over $1,600,000. The new U. S. Govt. building, costing about $2,400,000, contains the post-office, custom-house, and the U. S. Courts. Other notable buildings are the public building, city hall, public library, some of the school buildings, the Commercial and Columbia Club buildings, the Majestic, Law, Stevenson and Newton Claypool buildings, the Claypool hotel,.

INDIANAPOLIS.

Churches and Charities.—I. is the seat of an Episcopal bishop and of a Roman Catholic bishop with an auxiliary bishop. Including missions there are 12 Roman Catholic churches in the city, 47 Methodist, 16 Presbyterian, 7 Episcopal, 34 Baptist, 10 Congregational, 7 Lutheran, 15 Christian, 3 German Evangelical, 3 Evangelical Association, 3 Friends, 2 United Presbyterian, 5 German Reformed, one each of 11 other denominations. There are 4 Hebrew congregations. The charitable institutions include 15 hospitals, State, county, college, church, charitable, and private, 4 homes for the aged, 6 industrial schools, and orphan asylums, 4 homes for women and girls, 16 organized charitable and relief societies, and several such institutions as the Y. M. C. A., Y. W. C. A., Friendly Inn, Bureau of Justice, Humane Society, Day Nursery.

Education.—The public school system, supported by state and local taxation and a share in the state school fund, has 2 high schools, 60 primary and grammar schools, and a city normal school. There are also 22 Catholic schools, 2 Lutheran schools, 5 private schools and academies, besides the schools in connection with institutions. The University of Indianapolis is an organization formed in 1896 to unite several institutions of the city, including Butler College, first incorporated in 1850 as the Department of Liberal Arts; the Medical College of Indiana, organized in 1869; the Indiana Dental College, organized in 1878, and the Indiana Law School. There are in all five medical schools, two dental colleges, a law school, and 21 business, music and other special schools. The city also contains a Rom. Cath. Theological Seminary, a negro Baptist college, a United Brethren College, the John Herron Art Institute, a public library of over 100,000 volumes, the State Library with 35,000 volumes, the State Law Library with 40,000 volumes and numerous smaller libraries.

Manufactures.—According to the United States census of 1900 there was invested in 1910 establishments capital amounting to $36,628,114, employing 27,478 persons, including proprietors, and turning out products valued at $68,607,579. Among the most important industries are slaughtering and meat packing, whose product was $18,781,442 in the census year from 7 establishments; iron work of all sorts, $6,727,990; flouring and grist mill products, $3,802,373; carriages and wagons and material therefor, $2,812,498; furniture factory product, $1,685,827; saws, $1,587,827; malt liquors, $1,770,939; printing and publishing books and newspapers, $2,924,385; clothing, $2,190,050, half of it factory product; lumber and lumber-mill products, $1,588,797.

Finances and Banking.—According to latest statistics the assessed valuation of the city was $148,240,815 and the net public debt $2,645,800. The city's expenses

SOLDIERS' MONUMENT.

are about $1,200,000 a year. The post-office receipts are $635,000. The custom-house receipts are $165,000, and the valuation of imports $350,000. There are 13 banks and trust companies, including seven national banks. The aggregate capital of the national banks is about $4,300,000, their surplus about $1,900,000, and deposits over $18,000,000. The six trust companies have a capital of $2,900,000 and individual deposits of about $7,500,000. There are about 90 building, loan and savings associations.

Public Works.—There are 439.6 miles of platted streets, of which 92 miles are paved, 44 miles with asphalt, 27 miles with brick, 17 miles with wooden blocks, and 4 miles with macadam. The water-works, with about 225 miles of mains, are owned by the I. Water Co., and cost the city about $85,000 annually for service. Electric lights are in general use. The city pays about $115,000 a year for about 1,350 electric arcs for street lighting and about $7,000 for about 400 gas and vapor lights. The police department contains 175 men and costs $150,000 a year. There is also a well-equipped fire department, which costs about $175,000 a year.

Government.—The administrative department is in the hands of a mayor, elected biennially, and of boards appointed by him. The council consists of 15 members elected one from each ward, and 6 members elected at large, with a two-years' term of office. The city clerk and police judge are also elected biennially. The mayor's appointees are the city comptroller, attorney, civil engineer, boards of public works, 3 members of public health and charities, 3 members of public safety, and of commissioners of public parks 4 members. The school system is in charge of a board of 5 school commissioners elected at special elections.

History.—The first settlement on the site of I. was made 1819, before the cession of that part of the state to the govt. by the Indians. In the following year commissioners selected the site for the capital city of the state, and 1821 the locality was laid out as a town by Alexander Ralston, who had been connected with the laying out of the national capital. The streets and avenues were named after the states of the Union as far as they would serve at that time, but the principal one was called Washington. The name of I. was suggested by Jeremiah Sullivan, subsequently a judge of the supreme court. The town superseded Corydon as the capital of the state officially 1821 and actually 1825; was incorporated 1836; and chartered as a city 1847. Postal service was established 1822; the legislature met here for the first time 1825, Jan. 10; the first church was built by the Presbyterians 1823–4; the first private school was opened 1821; the first Sunday school, a union enterprise of all denominations, was opened 1823, Apr.; the first public school was the old seminary, built 1833–4; the first newspaper was pub-

lished 1822, Jan.; and the first municipal organization was effected 1822. In 1834 a branch of the state bank was established here, and 1847 the first railway was completed to the city. Industrial effort had its beginnings in the opening of a dry-goods store and saw and grist-mills 1821, and of an iron foundry and a steam mill (which proved a failure) 1832. From the first the city has had a steady growth, and 1890 ranked 27th in pop. It now has the Holly system of water-works (cost $1,000,000), 11 public parks, thorough sewerage, more than a dozen bridges across the river, gas and electric light and electric railways.

Pop. (1840) 2,692; (1850) 8,091; (1860) 18,611; (1870) 48,244; (1880) 75,056; (1890) 105,436; (1900) 169,164.

IN'DIAN AR'CHIPELAGO: see MALAY ARCHIPELAGO.

IN'DIAN AR'CHITECTURE: of styles varying at different times in India as in other countries, according to the religion prevalent at the time. The earliest religion of which we have any architectural monuments is that of Buddhism (q.v.). About B.C. 250, Asoka, a powerful monarch, became a strenuous supporter and propagator of Buddhism, and to his zeal are due the oldest architectural remains of India. The Buddhist remains are of two kinds: 1. Commemorative monuments, called Stupas or Topes (q.v.); the earliest stupas are single pillars, bearing evident traces of a western origin, and thus affording a clue to the history of Indian art. 2. Temples (chaityas) and monasteries (viharas). Of the chaityas and viharas, no built examples remain; they are all excavated out of the solid rock. There are no less than 40 or 50 groups of these monuments, each group comprising 10 to 100 distinct excavations. The great majority are Buddhist, and nearly the whole are monasteries, not over 20 to 30 being temples. The oldest are at Barhar and Cuttack in Bengal (B. C. 200), but they are few in number, nine-tenths of the caves being in the Bombay presidency (where there is softer stone). The latter date from the Christian era to about the 10th c. The cave-temple at Karli is one of the largest and finest: see BUDDHISM. In plan and general arrangements, it strongly, though no doubt accidentally, resembles a Christian basilica, with nave, aisles, and vaulted roof; and an apse with the shrine in the place of the altar. There is also an outer hall or atrium, and a gallery like the rood-loft. On the roof, are numerous wooden ribs, attached to the vault, these and other portions indicate that the building from which the cave was copied was wooden. This cave is 126 ft. long, 45 ft. 7 inches wide, and 40 to 45 ft. high.

The Vihara (q.v.) or monastery caves are numerous, as was required by the enormous number of Buddhist priests. The oldest and simplest examples are in Bengal, but the finest are in w. India. They consist of a central hall, with cells round three sides, and a verandah on the fourth side, next the open air; opposite the central entrance, there is usually a large cell or shrine, containing an image of Buddha. There are fine caves at Ajunta, Baugh, etc., many of them beautifully carved and painted. The pillars

are most elaborately ornamented, and have the bracket capitals which distinguish all Indian architecture From the absence of any built example, there has been great difficulty in forming a correct idea of the exterior of the buildings from which these caves were copied. By following the style into other countries where the religion has prevailed at different times, Fergusson has been able to trace it up to the present day, and to establish by analogy the probable external appearance of the early Buddhist architecture.

The temple of Brambanam, in Java, seems to show the original form of built cells. They are quite detached, and arranged in a square round a central temple—evidently suggesting the arrangement in the caves at Ajunta. Some rock-cut temples which have an exterior (at Mahavellipore), show the cells attached to the main building. In Burmah, where the monastic system still prevails, the monasteries, which are of wood are built in stages in a pyramidal form. The temple of Boro Buddor (q. v.,) in Java, has a similar arrangement, consisting of a large number of cells or niches in tiers; but in place of being occupied by priests, they are filled with cross-legged Buddhas, a conversion quite common in later Hindu architecture. In many styles of architecture, the niches or other subordinate parts are frequently copies on a small scale of the façade of the building itself. Thus, for instance, the windows with pillars and pediments in classic architecture, are a repetition of a temple end The niches inside the caves, containing statutes of Buddhist saints, are in a similar manner imitations of the main façade. In the same way externally, the Burmese pagodas and Hindu temples are ornamented all over with models of the buildings themselves. Buddhist architecture, whatever its artistic qualities may be, has at least the interesting feature of being a style which has existed from B.C. 200 to the present day.

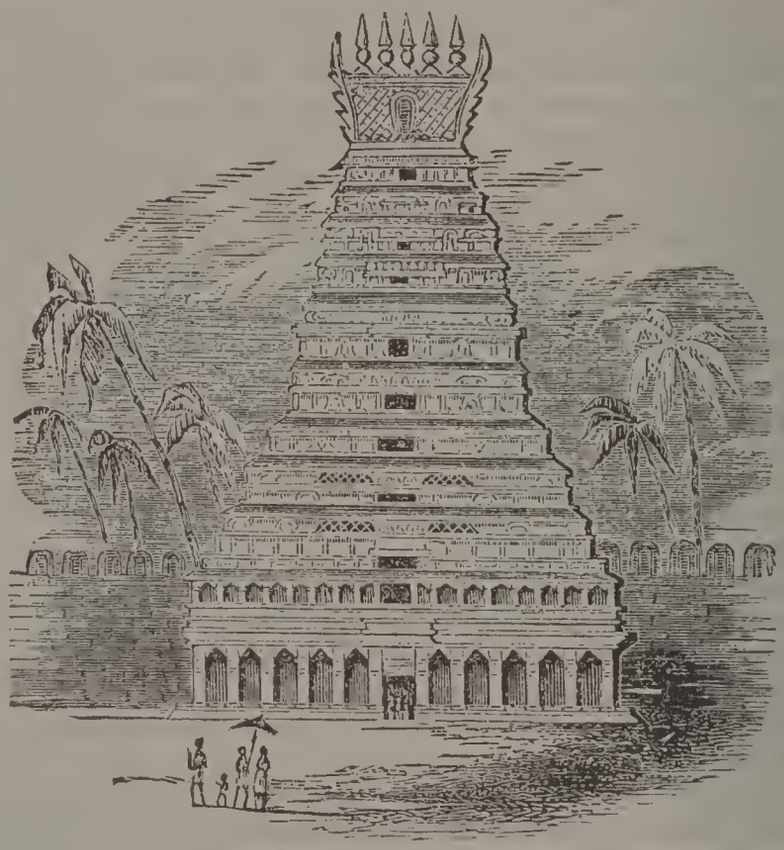
The other styles of Indian architecture are illustrated by the temples of the Jainas and those of the Hindus. The former seems to have been an imitation of the Buddhist temples without the cells for the priests. Their religious structures consist of a sanctuary surmounted by a spire; in front of this, a pillared vestibule, with a dome, and round the whole an arcaded inclosure, with cells all round, containing images. The cells also are surmounted with spires, and the arcades with domes are often repeated to a considerable number within one inclosure. The most striking feature of this style is the dome, constructed by horizontal jointing, not with regular arches. The domes, with the pillars, bracket capitals, etc., all are elaborately decorated.

Hindu architecture is divided into two styles—northern and southern. All the finest examples are southern, and are found s. of Madras. The temples consist of the temple or vimana, in front of which is the pillared porch or mantopa, the gate pyramids or gopuras, forming the entrances to the inclosure, and the pillared halls or choultries. In the south, the temple is always pyramidal, and in many stories; in the north, the outline is curved, and in one story.

The finest example is the pagoda of Tanjore. It is 82 ft. square at base, and 14 stories, about 200 ft. in height.

The gopuras are similar to the pagodas, but oblong in place of square.

The pillared halls are very wonderful structures, containing sometimes as many as 1,000 columns, and as these are all elaborately carved, and all different, the labor of their construction must have been enormous. The halls are used for many purposes connected with Hinduism, their most important use being as nuptial halls, in which the mystic union of the divinities is celebrated. The general arrangement of these halls sometimes produces a good effect; but from their flat roofs, they cannot equal the beauty of the domed arcades of the Jains. These buildings are of various dates, from the Christian era to the 18th c.; and it



Gopura, or Gate:
Leading into the inclosure of the temple at Seringham.

is remarkable that the oldest examples are the finest—the style growing gradually more and more debased, till at the present day, it has become, like the religion, a mass of absurdity and obscenity. The celebrated rock-cut temple, called the Kylas, at Ellora (q.v.), belongs to this style.

When the Mohammedans conquered India, they imitated the style of the country in their mosques, and afterward the Hindus borrowed from them, and thus a mixed style was created, which in the palaces, tombs, etc., of the native princes, produces picturesque effects. The Mohammedans also covered the country with specimens of their Moorish style: see SARACENIC ARCHITECTURE.

Some of the finest building of India are the ghauts or landing-places, at the rivers, with their broad flights of

steps; the reservoirs or bowlees, and dams, all ornamented with temples, kiosks, stairs, etc. There is one remarkable fact connected with Indian architecture, viz., that though the form of the arch is constantly used—in domes, arcades, etc., especially in the style borrowed from the Moslems—yet the arch with radiating joints is never adopted. The architraves are supported on bracketed capitals, which project, bracket over bracket, till the space is spanned by one lintel. This leads to many beautiful results in the early styles, and in the later mixed style, the bracketed cornices are among its finest features.

INDIAN CORN, or MAIZE, holds the leading place among the grains produced in the United States. It is a native of America and probably originated on the high table-lands of the sub-tropical portions of the continent. The first European visitors found it under cultivation in the W. Indies, Mexico, and Peru, and the colonists of Virginia and New England found it the principal crop grown by the Indians of those regions. It is now extensively grown in s. Europe, and in considerable quantities is produced in portions of Asia and n. Africa. It thrives over a wide range of climate and in a great variety of soils. A high temperature is required for its full development, but small varieties are grown as high as 47° north latitude. Excessive moisture, lack of sunlight and of intense heat during the summer, prevent its success as a field crop in England.

The stalks of corn are cylindrical in form, covered with a silicious substance, and filled with a fibrous pith. The leaves are long and flat, the largest ones being near the centre of the plant. The flower is in two portions, the staminate at the top of the stalk, in the form of a tassel, which bears large quantities of pollen, and the pistillate on the side of the stalk between the tassel and the ground, which is called the silk. The latter consists of threads which proceed from the ova. The latter is arranged in straight rows upon the cob which is closely covered with a number of leaves called husks, and from which the outer ends of the silk protrude. While there is but one species of corn, there are an immense number of varieties with more or less strongly marked characteristics. Owing to the peculiar formation of the flower, a variety can be kept pure only by being completely isolated from all other sorts. The pollen is carried long distances by the wind, and if it falls upon the silk of another kind it causes a mixture of the varieties. When a white variety is grown near a yellow sort, both white and yellow kernels will be found on a large proportion of the ears produced on each of the fields. To insure perfect purity, the variety to be maintained should not be grown within one-third of a mile of any other sort.

The different varieties of corn vary greatly in size, yield, and time of ripening. These qualities are modified by climate and soil, and are due largely to the environ-

ment of the plant. Some of the dwarf sorts, which have become adapted to a short season and a poor soil, grow only about three ft. high, produce very short and small ears, and ripen in 85 or 90 days. Other varieties adapted to hot regions with a long summer and a rich soil, reach a height of 18 ft., have ears 15 inches in length and 3 inches in diameter, and required about 150 days in which to mature. The plant has, in a remarkable degree, the power of adapting itself to its surroundings. Taken to a warmer climate and a richer soil than that in which it has been grown, it quickly increases in size, and requires a longer time in which to ripen. A variety which in Canada will ripen in 90 days from the time of planting will need three or four weeks more in which to come to perfection after being grown for a few seasons in the latitude of Philadelphia. The plant is as successful in a great diversity of soils as in a wide range of climate. Succeeding best in a rich, warm loam, it will yet grow in any land, from gravel to peat, which is not barren and is not extremely wet. The yield will be determined by soil, climate, variety, and cultivation. The average yield per acre in the United States in 1906 was 30.3 bushels, and ranged from 11 bushels in Florida to 42.6 bushels in Ohio. In small plots in Tennessee and Kentucky it is claimed that corn has been grown at the rate of 200 bushels per acre. The average yield in the great corn growing states is not far from 36 bushels per acre. It takes from the soil a smaller quantity of ammonia and a larger quantity of phosphoric acid and potash than an average crop of wheat. A large proportion of the potash appears in the stalk and cob. A special fertilizer for the corn-plant which is designed to add 50 bushels to the natural product of an acre of land, contains 64 lbs. of nitrogen, 77 lbs. of potash, and 31 lbs. of soluble phosphoric acid.

Planting is done as soon as the ground is warm and dry in the spring. In the northern and central states, where principally this crop is produced, this is from about May 10 to June 1. The seed is planted in hills or drills. The latter method gives the largest yield, but increases the cost of cultivation. The rows are three to seven feet apart, according to location and variety. Hills are from two and a half ft. apart for the dwarf kinds, to four or five ft. for the sub-tropical sorts. From two to five stalks are grown in a hill. In drill culture the stalks are about ten inches apart in the row. If a large crop is to be grown the land should be liberally manured. If on stubble land the manure may be plowed in. If sod land is chosen, the manure should be spread after the plowing is done, and be thoroughly worked into the soil. Commercial fertilizers should be lightly covered with a harrow. A liberal use of manures or fertilizers will promote rapid growth and largely increase the yield of both stalks and grain.

INDIAN CORN.

The variety to be grown should be selected with reference to the character of the land and the length of the season. The large and late-ripening sorts should only be planted on rich soils and where the summers are both long and hot. Some of the small and early ripening varieties can be grown on land of very moderate fertility and where frost comes about Sep. 1. The small kinds will bear much closer planting than the large ones, but crowding is always injurious. There must be no more plants than the soil can feed, and they must not stand so closely as to prevent access of sunlight and free circulation of air. The increased weight of the stalks secured by close planting is more than offset by an increased number of barren plants and a diminished size of the ears.

When the crop is grown on a large scale, planting is done with a machine, drawn by one or two horses, which does the work rapidly and well. Where the hill system is adopted, it is very desirable to plant in squares, so that the rows will be straight across the field as well as lengthwise of it, and thus allow the cultivator to be run between the hills as freely as between the rows. By this means the weeds can be kept down with little or no hand-hoeing, and the yield of the crop will be increased by thorough pulverization of the soil. Land devoted to this crop should be plowed six or eight inches deep; but cultivation, though frequent and thorough, should be comparatively shallow. In most circumstances level culture is far better than the older method of making large hills. As soon as the plants can be seen, a light smoothing harrow should be run over the field. This will destroy numberless weeds and promote the growth of the corn. This should be soon followed with the cultivator, which is to be used every week or ten days until the tassels appear. Weeds should never be allowed in the corn-field, but cultivation is to be carried on in clean fields for the benefit of the crop.

As the plant approaches maturity the leaves and stalks change from a dark green color to a lighter shade. If the stalks are to be saved for fodder, the corn should be cut as soon as the kernels are fairly glazed. The plants are cut near the ground, tied in bundles of convenient size, and set up in stacks of eight or ten bundles each. When fairly dried, which will be in three to five weeks, they are drawn to the barn and husked. The ears are put in well ventilated cribs, and the stalks packed in mows or stacks. Another method, now largely discarded, was to cut the stalks just above the grain, tie them in bundles and cure for fodder, leaving the corn to ripen in the field: then late in the season the ears were gathered, taken to the barn, and husked. In large portions of the West only the ears are harvested. The stalks are left standing until dry, and are then burned. When husking, the finest ears should be selected for

seed. Enough of the husks should be left upon them to admit of their being tied in strings or traces. They should be hung in a cool, dry place and kept until the following spring. If left upon the cob, the corn retains its vitality two or three years; but seed of the previous season's growth is preferred. By careful selection of seed through a long period, a great improvement in the quality and yield of grain can be secured, and the time required for ripening can be materially shortened. When grown expressly for fodder, corn is planted in drills about three and a half ft. apart and much more thickly than when grain is desired. About a bushel of seed is used per acre. Frequent cultivation is beneficial. As soon as large enough the stalks can be fed green to supplement the pastures. If the stalks are to be dried for winter use, they should stand until the ears are formed, but be cut before they are ripe. They should be set in small stacks and well cured before being stored. The yield per acre on good land is from three to four tons of dry fodder. This is double the quantity secured when the grain is allowed to ripen, and also the quality is superior. Corn is largely and profitably grown also for ensilage (see ENSILAGE). For fodder many growers prefer sweet corn to the ordinary field varieties.

The principal disease to which corn is subject is the smut. This is a parasitic growth, appearing on various portions of the plant, which in wet summers frequently occasions considerable loss. It is propagated by spores and absorbs its nourishment from the plant. Affected grains and stalks should be collected and burned. Seed should not be taken from fields in which this disease prevails, and some other crop should follow corn on land where it has appeared. Insects and birds often injure the crop by destroying the seed or plants, or preying on the ripened grain. Fall plowing, by which they are exposed to the action of the frost, will destroy many insects, and a rotation of crops will tend to prevent their multiplication in any given field. Birds can often be kept away by twine strung on poles around the field, or bright pieces of tin hung so they will reflect the light.

Corn is one of the most important of food products. In a green state it is extensively used in summer and canned for winter, and the ripened grain is ground and used in various forms. For feeding to animals, either for work or fattening, it is the cheapest and most extensively employed of all the grains. Great quantities are used also in the manufacture of starch. The juice of the stalks is very sweet and can be converted into syrup of fair quality. In experiments conducted by the government 1880 and 1881 sugar was made at the rate of 900 lbs. per acre from stalks which had matured a large crop of grain. The leading corn-producing states at present are Iowa, Illinois, Missouri, Kansas, Nebraska, and Indiana. In

1906 the U. S. produced 2,927,416,091 bu., valued at $1,166,626,479.

INDIAN CUCUMBER: single-species, perennial herb; nat. order *Liliaceæ*, tribe *Trillideæ*, known also as *Medeola Virginica* and *Gyromia;* indigenous chiefly to the rich moist woodlands of the central Atlantic (U. S.) states. It received its popular name from the cucumber-like shape and taste of its tuberous white root, which is said to have been eaten by the Indians, and its scientific from the sorceress Medea, because of a former belief that its root possessed valuable medicinal properties. It has a slender stem, 1-3 ft. high, near the middle of which is a cluster of 5-9 thin leaves, and at the top a cluster of 3 smaller leaves and 3-6 three petal flowers, which bloom in May and June.

IN'DIAN GRASS MATTING, or IN'DIAN MAT'TING; kind of matting imported in large quantities from Calcutta, made from a species of PAPYRUS (q.v.) *P. Pangorei,* called *Madoorkati* in Bengal, and there very abundant. The stalks of the plant, when green, are split into three or four pieces, which, in drying contract so that the edges come almost into contact; and when woven into matting, they show nearly the same beautiful shining surface on both sides.

IN'DIAN O'CEAN: one of the five grand divisions of the universal ocean; bounded s. by a line drawn from the Cape of Good Hope to the most southerly extremity of Tasmania or Van Diemen's Land. Its other limits reckoning from the last-mentioned point, are Van Diemen's Land, Australia, the Indian Archipelago, Farther India, Hindustan, Persia, Arabia, and Africa. Gradually narrowing from s. to n., the Indian Ocean forks at Cape Comorin into the Bay of Bengal on the e., and the Arabian Sea on the w., the latter again branching off into two arms, the Persian Gulf and the Red Sea, which reach respectively the mouth of the Euphrates and the neighborhood of the Mediterranean. These details exclude the waters of the Indian Archipelago, as belonging rather to the Pacific Ocean. As above defined, the Indian Ocean stretches in n. lat. 43° 35′ s. to 30°, and in e. long. 18° 29′ to 146° 12′. It contains thousands of islands, or rather tens of thousands. Of these, Madagascar is the largest, and at about the same distance from it to the e. as the continent of Africa is to the w., lie Bourbon or Reunion toward the s., and Mauritius toward the north. Next in size to Madagascar, and in fact, the only other island of any considerable magnitude, is Ceylon. As a channel of commerce, this ocean appears to have been the first to find a place in history, inasmuch as the earliest voyage on record beyond the land-locked Mediterranean —that of Solomon's navy—did certainly extend further than the Straits of Bab-el-Mandeb. In this respect, it virtually maintained its superiority fully 2,000 years.

INDIANS, AMERICAN: aborigines of the western continent; all the tribes which inhabited the new world when it first became known to Europe, and their descendants since that date. The name originated in a geographical misconception that this new world was but the projection or extension of India or the e. of Asia, and that consequently the natives were geographically connected with the people of the E Indies. The islands between N. and S. America were, accordingly, the 'W. Indies' The w. hemisphere has not been fortunate in the naming either of the country itself, or its aborigines.

The origin of the American race or races is still an unsettled question. The theory which hitherto, perhaps, has found most acceptance derives them from Asia, ferrying them across Behring Strait. In the Swedish Polar expedition (1878–79), Prof. Nordenskjöld traced in the Tchuktchis, on the n.e. coast of Siberia, an 'unmistakable stamp of the Mongols of Asia, and the Eskimo and Indians of America.' Lieut. Palander of the same expedition, however, assimilates those Tchuktchis to the Greenland Eskimo, while Peschel groups them with the native tribes of Kamtchatka. The Samoyedes and other Arctic races of Asia, it is further pointed out, are of Mongoloid stock, and distinctly round-headed; while the Eskimo, next to the Kai Colos of Fiji, are the longest-headed race on the globe.

The derivation of the American races in whole or in part from Chinese, Japanese, or other Asiatic arrivals on the w. sea-board, is attended with at least equal difficulties; for where are any affinities between such emigrants and the American races in language, customs, arts, modes of life? The latter, at the time of their discovery, had neither rice, wheat, barley, oats, or rye; nor iron; nor horse, sheep, camel, or poultry; all which, since then, propagate and flourish in the new world. The natives were found cultivating only maize, squashes, plantains, cassava, potato, tobacco. They had one poor beast of burden, the llama, confined to the uplands of s. Cordilleras, and one species of dog unrepresented in the old world. Their knowledge of metals was limited to copper, bronze, lead, gold, and silver. The language of the red men, furthermore, is generally different from all Asiatic languages; from the Indo-Chinese monosyllabic character, from the agglutinating Ural-Altaic, from the inflexional Semitic and Aryan; it, is in fact, a product pure and wholly of America, without any old world affinities or analogies whatsover; describable as polysynthetic or hugely agglomerative, expressing a whole sentence sometimes in a seventeen-syllabled word. This character applies to all their 760 inextricably intermixed languages. Then their physical, and for the most part their mental traits also are, as an *ensemble*, all their own. Their hair is universally black, straight, glossy, and long, never wavy, persistent to old age, properties characterizing also the hair of the mummies of the Ancon necropolis, and other places of Peru; the beard very scanty, generally wholly, sometimes only partially, rooted out; the eyes small deep-set, always horizontal, soft, partially

closed and languid when not roused by passion, and over set by narrow and high-arched eyebrows; the brow itself, broad and low, receding in a remarkable degree toward the flat crown; the cheek bones broad and prominent; the nose also prominent and sensitive, often very long and aquiline; the hands delicate and long-fingered, soft and smooth like the silken skin of the whole body; the whole figure supple, elastic, shapely, and agile. The features are generally regular, often handsome. The Crows, in particular, six ft. high, with exceedingly long hair reaching to the ground, and in some cases measuring 10 ft. (all of a piece), are described as decidedly handsome, or even noble. The women, with their soft luscious figures, dark soft eyes, delicate hands, and altogether feminine characteristics, are said to be not without sensuous attractions. In complexion they are mostly of a copper, cinnamon-brown, or olive-yellow hue, though there are also many varieties, merging on one side into the deep, almost negro tint of the Guaicuri and Pericui of Lower California, and the Charruas of Uruguay: and on the other side into the almost brilliant blonde of the Mandans and Hydas (Queen Charlotte islanders). The body lithe, swift, and supple, is yet not so strong generally as that of the European or Negro type, nor capable of so much hardship, fatigue, or enduring strain. In stature, the races range from the dwarfish Eskimo and the Peruvian, with a mean height of 4 ft. 9 inches, to the Crow of 6 ft. height, and the gigantic Patagonian. Psychically, the N. American, in his native state, is peculiarly haughty, serious, habitually taciturn and grave, yet on occasion eloquent and naïvely imaginative; full of simple child-like wonderment and trustfulness till suspicion has been aroused; with plenty of slumbering passion, which excited becomes over-mastering; in warfare stealthy, soft-paced, cunning, treacherous, with unslakable fury of revenge when the enemy is in his clutch; yet remarkably cold and stoical in outward manner, suffering with proud nonchalance the utmost extremity of fate. Altogether, he is somewhat of a sad, soft, serious, passionate, pathetic personage.

All signs, then, seem to favor the theory that the native Americans are as indigenous to the country as are its peculiar fauna and flora; or at all events, if they did originally issue from Asia, it must have been in a most remote, prehistoric time.

When the country was discovered, the most civilized parts were those extending from New Mexico to Peru, the best specimens of architecture being found in the Maya region and in Peru. The Pueblo Indians of New Mexico had towns surrounded by high walls scaled by ladders. There was also in Mexico a system of picture-writing, and there they boasted of records to a remote date. The Peruvians used quipos or knotted cords as aids to memory. In this quarter was also a more or less constituted government by kings and hereditary chiefs. Outside this region, the only monuments are mounds, principally in the Ohio valley, of peculiar shape, apparently

symbolical. In all America beside, the native races, in numberless, widely scattered, small-clustered tribes and clans, roamed their primeval forests of oak and pine, of cotton-wood and pecan, and the immeasurable prairies; subsisting chiefly by the chase, hunting the droves of buffaloes, the elk, the antelope, trapping beavers, etc. They had attained marvellous swiftness and precision of movement. From his horse at full gallop the Indian can shoot 15 or 20 arrows a minute at flying buffaloes, all with sure aim and deadly effect. The Gauchos and other mixed races of S. America, at the present day challenge the world in horsemanship. They will swing themselves under the belly of the horse, hang on there with toe and heel, while the horse is in full chase, then bound aloft on its back again at pleasure. The Indians almost all are hunters armed with bow and arrow, with spear and dart; in S. America, with lassoes and stoneballs attached to hide-ropes. In their wild state, they live in wigwams, of bark among the Iroquois, but generally of hides among the other tribes. They, especially the Crows, are skilled in dressing skins. Their own clothing consists of a robe and leg-covering for the men, and a short petticoat for the women, though in some warm places the clothing is very scanty. Some of the tribes dress richly and picturesquely. A chief is arrayed in a shirt or tunic made of two deer-skins, and embroidered with porcupine quills and the hair of scalps. Over this is a robe of the skin of the young buffalo-bull, with the hair remaining on, the inner or flesh side garnished with porcupine quills, and a rude portrayal of the battles or events of the wearer's life. The legs are encased in deer-skins, also ornamented, and the feet shod in moccasins of buckskin. All the tribes are fond of painting and tattooing their bodies, the figures being varied for grief or joy, for war or peace. The use of tobacco is almost universal, and a chief boasts a pipe four or five ft. long and two inches wide, wound with braid of porcupine quills, the bowl ingeniously carved by the chief himself. The calumet is the symbol of peace, and solemnizes all treaties and all great councils. The Indians believe in the Great or Good Spirit, but also in evil spirits particularly needing to be propitiated. The dead are solemnly buried with a supply of food and implements for the next world. One of the great features of Indian life is 'medicine' (the word adopted from the French) or mystery. The 'medicine man' is physician, magician, prophet, soothsayer, juggler, and high-priest. Every respectable Indian has a 'medicine bag,' made of the skin of an animal, bird, or reptile, and elaborately ornamented, stuffed with grass or moss, and religiously closed or sealed. This bag is in the highest degree sacred; days, and even a week, of fasting, and sacrifices of dogs and horses, being devoted to it. At 14 to 15 years of age a boy is 'forming his medicine'—that is, he wanders from his father's house, absenting himself for two, three, sometimes even five days, during which time he lies on the ground crying to the Great Spirit, and fasting all the time. After he has fallen asleep from

1. Adobe Houses in the Indian Town of Laguna, New Mexico.
2. The Snake Dance of the Moki Indians.

weariness, the animal that he dreams of is his 'manitou,' the protector assigned him by the Great Spirit for life. Having returned home and satiated his appetite, he sallies out with weapons to procure the animal or bird dreamt of, which he then preserves entire about him through life for 'good luck.' In death it is buried with him. To lose it in war or otherwise is to lose one's honor, retrievable only by conquest of the medicine-bag of a tribal enemy. All the Indian religions of N. America seem to have arisen out of ancestor worship (see TOTEM). In the science of medicine proper, the Indians have some empirical knowledge, having particular herbs and appliances for asthma, coughs, diarrhea, diseases of the skin, etc.

Before acquaintance with Europeans, the Indian beverage was almost exclusively water. In Mexico however, pulque (q.v.), the fermented sap of the agave, was drunk; and in S. America a beverage made from fermented cashew and other fruits.

The trained hauteur and stoicism of the Indians is remarkable. One day, during King Philip's war in New England, a chief ran unaware into the hands of the English. A young official 22 years of age questioning him, the chief refused conversation with him: 'You much child, no understand matters of war.' When sentenced to death, 'he liked it well, he would die before his heart was soft, or had spoken anything unworthy of himself.' Hatuay, a powerful chief of Hispaniola, urged by the Spaniards to embrace Christianity before he was burned, and thus go to heaven, refused to 'go where he would meet any of the accursed Spanish race.' In a reunion of the most intimate relations and friends, the Indians maintain the coldest reserve, and yet at death the lamentation of the survivors is extreme. In the Far West, and among the Rocky Mountains, where the Indians are yet intact from the whites, they are said by some visitors to live simply and hospitably. George Catlin, who lived eight years exclusively among different tribes of N. America—himself evidently of an artless, childlike, sylvan nature—looks upon the Indians 'as the most honest and honorable race of people I ever lived among in my life.' During all those eight years he everywhere met cordial hospitality and the kindest offices at their hands, while he 'never lost the value of a shilling among them.'

'Civilization,' however, as an external contact merely, has proved the ruin of the Indians morally and physically. Thirst for revenge, unquenchable hate, loss of self-respect, and whisky, have been the constant heritage (especially in the United States) entailed on the reds by the approach of the whites. The result of the English settlements, and the policy of the United States, have all along been to thrust the Indians ever farther into the west, till now there are no wild tribes e. of the Mississippi. The Cherokees and Creeks were bodily removed from Georgia to the Indian Territory 1838. Virginia had three Indian wars or massacres, 1622, 1629, 1637; New England two—the Pequot war, 1637, and King Philip's war, 1675. The United

States policy with the Indians has not been satisfactory or successful, and difficulties and small wars have been frequent. Christian missons have been largely prosecuted among them by individuals and societies. The French and the Spaniards had missions; and of Prot. missionaries the names of Mayhew, John Eliot, and the Brainerds are conspicuous. The five civilized tribes of the Indian Territory (q.v.) raised (1890) over 4,000,000 bushels of grain, and had 295 schools, and 10,000 pupils—industries being taught there and on the other reservations. Nevertheless, as rule, the Indians recognize their inevitable doom, and all spirit dies out of them. 'They are migrating to their fathers and the setting sun.' In Canada, in the spring of 1885, the half-breeds and Indians of the N.W. Territory rebelled under Louis Riel, who, after their defeat by General Middleton, was hanged. Three towns of Canada are exclusively Indian. The great mass of Spanish Americans are of Indian origin. In Canada there were in 1890 about 104,000. In N. America altogether, the Indians were calculated at considerably less than four millions; and in S. America, including pure and mixed, about seven millions.

In the United States and territories, excluding Alaska, there were reported (1900) 270,544 Indians, and the Ind. pop. of Alaska, full-bloods and half-breeds, was (1890) est. at 23,531. Of the 270,544, 98,189 wore citizens' dress and were classed as civilized and semi-civilized. The Five Nations in the Ind. Terr. numbered: Cherokees, 29,599; Choctaws, 14,397; Creeks, 14,632; Chickasaws, 7,182; and Seminoles, 2,561; total, 68,371. These were regarded as the most civilized in the country. the most civilized in the country.

The Indians of the United States are either settled upon reservations or have cast off their tribal relations and become citizens. There are no more roving bands. The civilized Indians of the states and territories were distributed as follows (1890): Ala., 759; Ariz., 1,512; Ark., 218; Cal. 11,517; Colo., 107; Conn., 228; Del., 4; D. C., 25; Fla., 171; Ga., 68; Id., 159; Ill., 97; Ind., 343; Io., 60; Kan., 736; Ky., 71; La., 627; Me., 559; Md., 44; Mass., 424; Mich., 5,624; Minn., 1,888; Miss., 2,036; Mo., 127; Mont., 860; Neb., 2,893; Nev., 3,599; N. H., 16; N. J., 34; N. M., 8,554; N. Y., 726; N. C., 1,514; N. Dak., 194; O., 193; Okla., 10; Or., 1,258; Penn., 983; R. I., 180; S. C., 173; S. Dak., 782; Tenn., 146; Tex., 704; Utah, 608; Vt., 34; Va., 349; Wash., 3,655; W. Va., 9; Wis., 3,835; Wyo., 43. Besides the schools on the various reservations the govt. defrays the expense of educating Indian children at the Carlisle (Penn.) School, and the Hampton (Va.) Normal and Agricultural Institute (q.v.).

Bureau of Indian Affairs.—The control of all Indian affairs in the United States and territories is vested by law in a bureau of the Interior Department, with a commissioner and asst. commissioner in charge. The Board of Indian Commissioners consists of 10 persons, selected by the pres. for their eminence in business, educational, re-

ligious, or philanthropic work, who choose one of their number for sec., and, excepting the sec., receive no compensation. They supervise all expenditures of money for the Indians, inspect all goods purchased, and have access to all books and papers relating to the service, but are not required to perform clerical work. The pres. also appoints 5 Indian Inspectors, by whom each superintendency is visited twice a year, and their business management fully investigated. The inspectors are empowered to enforce all laws relating to the Indians, and to prevent the violation of any law; and also to suspend for cause any supt., agent, or other employee, and temporary fill the vacancy. They receive $3,000 per annum each. The pres. also appoints 4 or more supts. of Indian affairs, each having a general supervision and contol over the official conduct and accounts of all officers and persons employed by the govt. in Indian affairs within a specified jurisdiction; a supt. of Indian schools; and a large number of Indian agents, sub-agents, and traders.

Agency System.—Each Indian agent is appointed for 4 years, required to give a bond, manages and superintends the intercourse with the Indians in his particular jurisdiction according to law, and executes new laws and regulations that may be provided. He is required to reside and keep his agency within or near the tribe of Indians to which he is assigned, and may not leave his agency withou permission. The limits of each superintendency, agencyt and sub agency are established by the sec. of the Interior Dept., either by tribes or by geographical boundaries. An interpreter (educated Indian preferred) is allowed each agency. Indian traders are appointed on giving bonds of at least $5,000 for the faithful observance of all laws regulating trade and intercourse with the Indians, and may open stores for trade among the tribes to which they are assigned.

The following is from A. H. Keane's General Scheme of American Races and Languages:

1. Sub-Arctic Races—Eskimos Aleuts, Thlinkeets.
2. Athabascan or Tinney family.
3. Algonquin family, from Canada to S. Carolina, and from the Atlantic to the Rocky Mountains. To the northern branch belonged or belong the Chippewas or Ojibways, Ottawas, and Crees; to the eastern, the Abenakis, Penobscots, Mohicans, or Mohegans; to the southern, Powhattans, Rappahannocks, Shawnees; and to the western, Illinois, Miamis, Cheyennes, and Blackfeet.
4. Wyandot-Iroquois family, from Upper Canada to W. Virginia, surrounded by Algonquins. To them belong Wyandots or Hurons, Iroquois or 'Six Nations' (including Mohawks, Oneidas, Onondagas, Senecas, Cayugas, Tuscaroras), and Monocans.
5. Dakota or Sioux family, including Assiniboines, Winnebagoes, Omahas, Iowas, Kansas, Crows.
6. Appalachian Races — Muscogee group, Cherokees, Catawbas, Natchez, etc.

7. Columbian Races.
8. Californian Races.
9. Shoshone and Pawnee families, from Idaho to New Mexico, including Utes, etc.
10. New Mexican and Arizona Races—Pueblos nations, etc.
11. Mexican Races—Aztec-Sonora group, Miztec, Zapotec, Zacatec, etc.
12. Central American Races.
13. Orinoco Races—Carib family, Barré family, etc.
14. Amazon Races.
15. Peruvian and Bolivian Races.
16. Brazilian Races—Guarani family, Botocudos, etc.
17. Patagono-Chilian Races—Araucanians, Puelches, Tehuelches, Fuegians.

IN'DIAN SHOT (*Canna Indica*): plant common in almost all tropical countries; a herbaceous perennial, with a creeping root-stock (*rhizome*), and a simple stem, formed by the cohering bases of the large, tough, ovate-oblong leaves. It belongs to the nat. ord. *Marantaceæ*. It derives the name Indian Shot from the seed, hard, round, and about the size of a very small pea, and which is sometimes used as shot. The seed yields a beautiful red color. The root-stocks are very large, spongy, and jointed, and are used in Brazil for emollient poultices in tumors and abscesses. The root-stocks of some of the other species of *Canna* are more valuable, yielding the starch called TOUS-LES-MOIS (q.v.).

INDIAN SUMMER: the name given to a period of mild summer weather which generally occurs toward the end of autumn. The term first made its appearance in the last decade of the 18th c. During the next decade the phrase was 'second summer.' The term Indian summer became established about 20 years after its first appearance, which was in western Pennsylvania, and spread to New England by 1798, to New York by 1799, to Canada by 1821, and to England by 1830. The term is, then, not an Americanism; to write in praise of Indian summer is now a literary convention of three continents.

It is by no means easy to account for the origin of the term. The principal characteristics of the season which it describes are haziness, smokiness, and high temperature. Some explanations of the origin of the term are (1) that the Indians predicted such seasons of weather; (2) that the smokiness was produced by Indian fires; (3) that this was the last season of Indian attacks on the settlements of the whites; (4) that the season partook of the Indian character of deceptiveness; (5) that the name was given because one of the seasons of East India was similar in character. Horace Walpole used the term in 1778, not in reference to America, but in relation to weather in the tropics. 'Squaw winter' was a name for the season of cold weather preceding the Indian summer.

IN'DIAN TER'RITORIES of British America: name formerly given to the vast region, now mostly known as the NORTHWEST TERRITORY of Canada (q.v.).

IN'DIAN TERRITORY: formerly an unorganized territory of the United States, set apart by the federal government as permanent reservations for peaceful Indians, to which was added by cession by Texas a strip of 'public land,' 35 m. wide, between the 100th and 103d meridians, though it is not officially considered a part of it. Since 1907 it has been a part of the state of Oklahoma. See *History*.

Location and Area.—Excluding the 'public land,' Indian Territory is in lat. 33° 35′—37° n., long. 94° 20′—100° w.; bounded on the n. by Colo., Kan., and Okla., e. by Mo. and Ark., s. by Tex., and w. by Okla.; area 31,400 sq. m. (20,096,000 acres); chief town Tahlequah.

Topography.—In the extreme n.w. are the foot-hills of Rocky Mountains, whence the surface gradually slopes, e. and s.e., and is in general arid and treeless; in the centre are fertile bottom-lands; and in the e. are broad tracts of fine agricultural soil, with some stony places and few trees. The territory is drained by the Red river, which forms the s. boundary, and receives its n. fork and the Washita river; and the Arkansas river, which receives the Cimarron where it crosses the boundary of the Osage and Creek nations, and the Canadian with its numerous forks at the boundary of the Cherokee and Choctaw nations. These rivers traverse the territory, e. to w., and between the Red and Canadian rivers are the Washita, Poteau and Sans Bois Mountains.

Geology.—Azoic rock formations are found in the Cherokee and Creek nations, but the dominant strata are carboniferous, with some cretaceous and tertiary in the n.w. The carboniferous region is known to contain large semi-bituminous coal measures.

Zoology.—A few fish are found in the rivers; birds in great variety abound in all parts; the buffalo is nearly exterminated; some wild horses are occasionally seen; but deer, black bear, prairie dog, prairie hen, wild turkey, and several kinds of grouse are numerous.

Climate.—The w. portion is warm, dry, and subject to drought, the e. has an adequate rainfall, and the central a mean annual temperature of 57°—59°. Cold n. winds are frequent in the w. In general the climate is healthful the year round.

Agriculture.—In 1900 there were 45,505 farms comprising 7,269,081 acres, of which 3,062,193 were improved and 4,206,888 unimproved; the farm lands with improvements, including buildings, were valued at $46,863,440, the implements and machinery at $3,939,480, live stock at $41,378,695, and all farm property at $92,181,615. In 1906 the principal crops were corn, 68,493,264 bushels, value $21,917,844; wheat, 2,890,188 bushels, value $1,791,917; oats, 7,446,571 bushels, value $2,382,903; potatoes, 930,772 bushels, value $698,079; hay, 64,-

596 tons, value $355,278; flaxseed, 50,272 bushels, value $47,758; some cotton, and about $1,000,000 worth of vegetables and fruits. The farm animals in 1907 comprised 296,400 horses, 70,200 mules, 111,547 milch cows, 503,000 other cattle, 30,977 sheep, and 788,920 swine, the total value being about $40,000,000.

Manufactures.—Beyond agriculture and stock-raising the principal industries of the Indians till recently have been lumbering, shingle-making, blanket and shawl weaving, maple-sugar-boiling, wool-clipping, bark-peeling, and basket-making.

But within the decade a considerable genuine manufacture by whites has arisen. In 1905 there were 466 manufacturing establishments, capitalized at $5,016,654, employing 2,257 wage-earners, whose wages aggregated 1,144,078; the cost of materials used was $4,848,646, and the value of products was $7,909,451. The most important industries, with value of products were: Flour and grist-milling, $2,582,657; cotton-seed oil and cake, $1,505,299; printing and publishing, $588,517; lumber and timber products, $588,078; brick and tile, $248,931; manufactured ice, $242,334; saddlery and harness and car-shop work were also noted.

Railroads.—Railroad building has been retarded by the opposition of the Indians, but within the last few years considerable progress has been made, and in 1905 there were 2,686.47 miles of railway in operation in the Territory. Several great lines cross it, giving the facilities for the vast business growth. The main lines are the 'Frisco System (St. L. and San F.), the St. Louis, Iron Mountain & Southern, the Missouri, Kansas & Texas, the Choctaw, Oklahoma & Gulf, the Atchison, Topeka & Santa Fe, and the Ft. Smith & Western. There were also 2 lines of electric railway operating 27 miles of track.

Banks.—In 1907 there were 168 national banks in operation with total resources of $35,611,613.44, capital of $7,127,500, surplus of $1,862,761.41, and individual deposits of $19,177,863.78. There were also 57 state and private banks with resources of $3,538,299, capital of $1,362,300, surplus of $51,889, and individual deposits of $1,752,833.

Religion.—Missionary work among the Indians has always been active. Churches are numerous and the membership growing, the chief denominations being: Meth. Episc. (S.), Bapt. (S.), Disciples of Christ, Presb. (in the U. S. of Am.), Rom. Cath., Presb. (Cumberland), Meth. Episc., and Church of God.

Education.—Educational efforts are confined almost exclusively to the Five Nations, though of late many schools for white children have been erected. In 1905 there were 169,868 children of school age, 48,078 were enrolled, and the average daily attendance was 28,487. There were 464 male and 861 female teachers whose salaries aggregated $470,100, and the total expenditure was $715,332. There

were eight public high schools, seven private secondary schools, and two colleges. The principal institutions are Indian University (Bapt.), Bacone; Henry Kendall College (Presb.), Muscogee; Hargrove College (M. E. So.), Ardmore; Atoka Baptist Academy; Cameron Presbyterian Institute; Chelsea Academy (Unit. Presb.); Spaulding Institute (M. E. So.), Muskogee; Ryan Educational Institute (non-sect.); Willie Halsell College (M. E. So.), Vinita.

History.—Indian Territory was a part of the Louisiana purchase from France 1803; was designated by the federal government as the permanent home of the Indian tribes e. of the Mississippi river 1832, was settled by the Creeks, Choctaws, Chickasaws, and Cherokees 1833-8, and the Seminoles, Sacs and Foxes, Comanches, Modocs, Nez Perces, and other smaller tribes at various intervals since. During the civil war a large part of the Five Nations was engaged in the confederate service. In 1866 the Creeks ceded to the govt. the w. half of their entire domain, about 3,402,428 acres, and the Seminoles their entire domain of 2,037,414 acres. These ceded lands took the name of the 'Oklahoma country,' and 'boomers' immediately began organizing to take possession of them. U. S. troops were kept busy several years protecting the Indians surrounding the coveted tract, and expelling the armed and determined 'boomers' who occasionally crossed the prohibited lines, and sought to pre-empt homesteads. Under an act of congress and by proclamation of Pres. Harrison, 3,000,000 acres of the Oklahoma country were thrown open to settlement at noon 1889, Apr. 22. This and other territory was formed in Oklahoma 1890, May 2. Meantime the old system in the eastern part was going to wreck, not so much from the white immigration, following the railroads which began to cross it, as from internal development which was making the primal object of the system a mockery. It was designed to protect the half-helpless Indian from white greed till he could stand on his own feet; in fact, the half-breeds and the intermarried whites were rapidly appropriating everything to themselves, while the full-blood was 'crowded out upon the mountain and unproductive land, to take care of himself as best he could.' (Dawes Commission.) The tribal governments were under control of these governments and were 'recklessly leasing the community lands to cattlemen and coal companies' (Hinton), to railroads, oil and lumber companies, etc. The government, therefore, under the lead of ex-Senator Henry L. Dawes, of Massachusetts, set about negotiations to break up the tribal governments, and turn the territory into a set of ordinary civilized communities with ownership in severalty, protecting the Indian for a time by restraining his liberty of alienation. The Dawes Commission of 1893 began this work; in 1897 the United States extended its judicial power over the district; in 1898 the

Curtis Act carried out the work, providing for the enrollment of citizens for allotment of lands, for laying out town sites and incorporating towns with power to elect officers and tax themselves for schools, etc., and giving the President a veto power over the tribal legislatures. This arrangement continued in force till the Territory was united to Oklahoma under the latter name, and admitted to the Union as the 46th state. The enabling bill was signed by President Roosevelt in June, 1906, and by official proclamation was formally admitted 1907, Nov. 16, with Charles N. Haskell as first governor. For government, see OKLAHOMA.

Chief Cities and Towns.—The towns which grew in the former territory had a peculiar status. They were 'white' towns with white men occupying the buildings they had erected, and doing business insecurely, without legal title, but the ostensible owners of the ground were the Indians. The so-called Curtis Bill and the various agreements made with the various tribes changed this condition, and made it possible for the white man, or any other occupants of towns in the Indian Territory to purchase lots under the various provisions of these bills upon which they owned houses or other valuable improvements. The result is that all the larger towns have been platted, surveyed and sold to the occupants, so that the Indian titles have become almost entirely extinguished. The changes are so great and constant that statistics are nearly as useless as in a new mining district, but it may be said that the present chief towns are Ardmore, and Chickasha, in the Chickasaw Nation, South MacAllister in Choctaw Nation, and Muskogee in the Creek Nation, is the handsomest town in the territory, with good public schools, churches and four colleges of the four leading denominations—Baptist, Methodist, Presbyterian, and Roman Catholic. These towns now have a population approaching 10,000 each, and there are over 20 others with over 1,000. The oldest white settlement is Vinita in Cherokee; the oldest in the southeast is Caddo; the best known has always been Tahlequah, for some generations the capital of the Cherokee Nation.

Population.—The following table gives the population according to the census of 1900:

Nations and Reservations.	1900.
Cherokee nation	101,754
Chickasaw nation	139,260
Choctaw nation	99,681
Creek nation	40,674
Seminole nation	3,786
Modoc nation	140
Ottawa reservation	2,205
Peoria reservation	1,180
Quapaw reservation	800
Seneca reservation	970
Shawnee reservation	297
Wyandotte reservation	1,213
Not located by nations or reservations	.....
Total	391,960

IN'DIAN TOBAC'CO. See LOBELIA.

IN'DIAN YEL'LOW, or PURREE, *pĕr'rĕ;* coloring matter highly esteemed by artists. It is exported from the E. Indies in masses of three or four ounces weight, of dark brown color externally, but of bright orange yellow in the interior. An essential element in its composition is carbonate of euranthin. It is almost insoluble in cold water or alcohol, but is soluble in hot alcohol and in ether; it dissolves freely also in boiling dilute hydrochloric acid.

INDIA-RUBBER, or CAOUTCHOUC, *kô'chôk,* or GUM-ELASTIC: the dried milky juice of various tropical plants, extensively used in the arts. Its formerly usual name, Caoutchouc, is a native Indian word. A volatile liquid distilled from India-rubber is called Caoutchine, *kô'chĭn,* or Caoutchoucine, *kô'chô-sĭn.* The milky juice is found most abundantly in the nat. orders *Moraceæ, Euphorbiaceæ, Apocynaceæ, Asclepiadaceæ,* and *Papayaceæ.* The substance of the gum exists in the milky juice of plants growing in temperate climates; but it is only in tropical and sub-tropical countries that it occurs so abundantly as to be of economical importance. Its uses to the plants in which it is elaborated have not been ascertained, nor even probably conjectured. In the milky juice, the caoutchouc is diffused in the form of minute globules, and not, strictly speaking, in solution; and when the juice is extracted from the plant, and allowed to stand for a short time, these globules separate from the watery part of it, and form a sort of cream on the top, or, in close vessels, appear throughout it as a flaky coagulum. Caoutchouc must have been known in America at a very early period, because balls made of the *gum of a tree,* lighter and bouncing better than the wind-balls of Castile, are mentioned by Herrera when speaking of the amusements of the natives of Haiti, in his account of Columbus's second voyage. In a book published in Madrid, 1615, Juan de Torquemada mentions the tree which yields it in Mexico, describes the mode of collecting the gum, and states that it is made into shoes; also that the Spaniards use it for waxing their canvas cloaks to make them resist water. More exact information regarding caoutchouc was afterward furnished by M. de la Condamine, who visited South America 1735; and it is noticeable that some of the purposes for which India-rubber is most extensively used at the present time are those for which it was used in S. America nearly three centuries ago. It was first known by the name of *Elastic Gum,* and received the name of India-rubber from the discovery of its use for rubbing out black-lead pencil marks, for which purpose it began to be sent to Europe in small quantities about the end of the 18th c., being much valued by artists, and sold at a high price. Even before this time its employment for the manufacture of flexible tubes for the use of surgeons and chemists had been

successfully attempted; but the expensive character of the solvents then known for it prevented its general application to any purpose in the arts. It was not till 1820 that its employment began to extend beyond the rubbing out of pencil marks, though in the meantime the quantity imported had considerably increased. Its application to the manufacture of water-proof cloth first gave it commercial importance. About the same time a method was discovered of fabricating articles of various kinds by casting caoutchouc in molds. Its elasticity and flexibility, its insolubility in water, and its great impenetrability to gases and fluids in general, have now been found to adapt it to a great variety of uses; but for by far the greater number of its applications it is now employed in the vulcanized state.

Brazilian or Para India-rubber is the product of several species of *Siphonia* (nat. ord. *Euphorbiaceæ*), chiefly *Siphonia elastica.* Bates says that 'this tree is not remarkable in appearance; in bark and foliage it is not unlike the European ash, but the trunk, like that of all forest trees, shoots up to an immense height before throwing off branches.' The India-rubber produced in New Granada, Ecuador, and Central America is obtained from *Castilloa elastica* (nat. ord. *Artocarpaceæ*); that of East India from the beautiful glossy-leaved *Ficus elastica* (nat. ord. *Moraceæ*), now a common ornamental plant in conservatories; that of Borneo from *Urceola elastica;* and that of w. Africa from several species of *Landolphia,* and also *Ficus.* Species of *Vahea, Willughebia; Euphorbia,* and other genera yield useful varieties of caoutchouc, and the sources of some kinds are unknown.

A wasteful method of obtaining the juice is sometimes practiced—cutting down the trees; the usual way is to tap the trees, as in a sugar-bush. The juice is first received in clay basins, and then is solidified in various ways, as by spreading it out in thin layers and evaporating it in the sun or by the aid of artificial heat; or the emulsion is coagulated by the leaves of a kind of vine; this method is used in Central America, but the product is inferior in sundry respects to that obtained by evaporation. The evaporation product is known as 'biscuit.' The fresh juice has the consistence of cream, is yellow, miscible with water, but not with naphtha or other solvents of ordinary India-rubber; its specific gravity is 1.02—1.41; the yield of India-rubber is about 30 per cent. Pure India-rubber has the composition, carbon 87.5, hydrogen 12.5. The finest quality of India-rubber is that from Brazil (Pará), which seldom contains more than 15 per cent. water, and which has least foreign impurities. The other S. and Central American kinds are of medium quality. E. Indian India-rubber ranks next; the poorest kind is the w. African—offensive in odor, only slightly elastic, and loaded with foreign matters.

INDIA-RUBBER.

Pure India-rubber is devoid of odor and is nearly white; it has the specific gravity .915. In texture it is porous and cellular, and absorbs 10-25 per cent. of water when long soaked in it. It also absorbs alcohol. It consists of two substances identical in chemical constitution but different in their mechanical properties, viz., a hard or fibrous and a soft or viscous substance. On subjecting a piece of raw India-rubber to the action of such a solvent as cold benzol, the difference between these two constituents becomes evident, for then the fibrous or hard constituent merely swells up, often reaching a size many times as large as its original bulk, while the viscous constituent forms a true solution. In a high-class India-rubber, as that imported from Pará, the former modification is the principal factor; but in inferior qualities the viscous substance is predominant. Freshly cut surfaces of India-rubber unite together firmly, owing to the presence of the viscous constituent; vulcanization, by hardening this, destroys the property of adhesion.

Commercial India-rubber is a tough, fibrous substance, possessing elastic properties in the highest degree. Reduced to the temperature of freezing water (32° F.), it hardens, and in greater part, if not entirely, loses its elasticity, but does not become brittle. When heated, as by placing in boiling water, it softens and becomes very much more elastic than at ordinary temperatures, though it does not in any degree dissolve in the water. If suddenly stretched to seven or eight times its original length, it becomes warm; and if kept in this outstretched form for several weeks, it appears to lose, in great part, its elastic properties, and in this condition is readily cut into those thin threads which are used in the *elastic* put in gloves, bonnets, etc., and the elasticity of which is readily renewed by the application of gentle heat. Of late years, however, elastic thread is prepared usually with vulcanized rubber India-rubber of commerce is insoluble in water and alcohol, is not acted on by alkalies or acids, except when the latter are concentrated, and heat is applied; but is soluble in ether, chloroform, bisulphide of carbon, naphtha, petroleum, benzol and the essential oils of turpentine, lavender, and sassafras. Many other essential and fixed oils, when heated with India-rubber, cause it to soften and produce thick glutinous compounds, especially linseed oil, which, in the proportion of 1¾ lbs. of the oil to 4 oz. India-rubber in thin strips or films, yields a solution which, when strained, is of great use in rendering shoes, cloth, etc., water-proof. When heated to 248° F., India-rubber fuses; and at 600° it is volatilized, at the same time undergoing decomposition, and yields a liquid called *Caoutchoucine* or *Caoutchisine*, with the specific gravity 680, and possessing great solvent powers over India-rubber and other substances. Caoutchoucine is necessarily very expensive,

hence its use is limited; but cordage steeped in it and dried acquires great supple and tenacious properties, and cloth saturated with it, and dried by exposure to air, becomes water-tight.

In the employment of India-rubber as a branch of manufacture, the first operation is the purification of the crude material as it comes from abroad. The crude material is cut into minute shreds, and washed by powerful machinery, immersed in water, which releases the solid impurities, and the pure India-rubber being removed, is placed on iron trays, and dried in a room heated by steam. The material then undergoes a process of kneading under very heavy rollers, which causes the adhesion of the various pieces of India-rubber to each other, and ultimately yields a mass or block of India-rubber in which the condensation is so perfect that all air-holes, and other cells and interstices, disappear. The block of India-rubber is then cut under water by powerful knives or shears into sheets, from which the pieces sold by stationers may be shaped out, or from which India-rubber bands or threads may be obtained. In the manufacture of square threads, mere cutting is had recourse to; and the delicacy of the operation may be understood when it is stated that 1 lb. of India-rubber will yield 32,000 yds. of thread. The round thread elastic is prepared from India-rubber which has been treated with about double its weight in bisulphide of carbon, containing about 5 per cent. of alcohol, which yields a soft material resembling in consistence bread-dough or putty; and this being squeezed through a series of small holes, is obtained in minute round threads, which are first received on an endless piece of velvet, and ultimately on an endless web of common cloth 500 to 600 yds. long, during the transit of the threads along which the solvent or bisulphide of carbon evaporates, and leaves the firm India-rubber. When it is wished to weave these threads into cloth, they are wound upon bobbins, taking care to stretch the India-rubber as much as possible, so as to deprive it, for the time being, of its elasticity; and after it has been woven into the cloth, a hot iron is passed over the fabric, and immediately the India-rubber resumes its elasticity.

In the manufacture of water-proof clothing, or Mackintoshes (see MACKINTOSH), which was the first application of India-rubber on a large scale, the mass of India-rubber is made into a solution with spirits of turpentine, or other solvent, and spread upon the cloth; when thus coated, the fabric is pressed between heavy rollers. This variety of water-proof cloth has now, however, been almost entirely superseded by another kind made with vulcanized rubber.

Vulcanized India-rubber.—Pure India-rubber is now used only to a limited extent in the arts, but it is applied in the vulcanized state to an almost endless variety of purposes. The remarkable change which it undergoes

when mixed with sulphur and heated, according to circumstances, from 240° to 310° F., was discovered by Charles Goodyear (q.v.), of New Haven, Conn., 1843, and independently, about the same time, by Thomas Hancock, in England. In the process of vulcanizing, the India-rubber, as a preliminary step, is either torn into shreds or crushed into thin pieces by machinery, and afterward washed. There are two principal vulcanized kinds, one hard and horny in its texture, the other soft and elastic. In the case of the former, the method is to mix the India-rubber with one-third of its weight of sulphur, and heat it for several hours, the temperature finally rising to fully 300° F. For the soft vulcanized kind a much smaller proportion of sulphur is required—namely from 2½ to 10 per cent., and the heat to which it is subjected in the vulcanizing chamber is considerably less. Usually, too, with this latter kind, the articles are made before the India-rubber is heated. The sulphur is commonly added in the ground state, but sometimes the India-rubber is treated with some solution containing this element, such as the bisulphide of carbon.

Although sulphur is the only essential ingredient required for vulcanizing India-rubber, yet other substances are usually added. Thus, in the case of machinery belting, pipes, and some other articles, the silicate of magnesia (French chalk) is used to prevent adhesiveness. Litharge, or carbonate of lead, is frequently mixed with the India-rubber and sulphur for certain purposes; but there is really a long list of materials more or less used in preparing different qualities of the vulcanized kind, each manufacturer using mixtures the exact nature of which he is careful not to divulge. Asphalt, tar, lampblack, whiting, rosin, sulphide of antimony, and ground cork, are some of the ingredients most commonly used. Belting for machinery, and some kinds of tubing are formed of alternate layers of canvas and vulcanized India-rubber.

Natural caoutchouc, as already stated, is elastic, cohesive, impervious to gases, insoluble in water, and resists many chemical reagents; but it loses its elasticity by cold, softens by heat, and is destroyed by many fixed oils. After being vulcanized, caoutchouc has its elasticity greatly increased, is not hardened by cold, and does not soften or become viscid at any temperature short of its absolute decomposition. Besides, it is barely soluble in turpentine, naphtha, and the other solvents of pure caoutchouc; nor does oil readily penetrate or soften it.

From 1843, when vulcanized India-rubber was first made, to the present time, the various patented applications of it must be two or three thousand. The mere abridgments of the specifications connected with this material, issued by the English patent office, form a thick volume. For a brief description of the process of making India-rubber shoes (see OVERSHOES). Water-proof

coats are now made in a similar way, the mixture of India-rubber and vulcanizing materials being pressed on the surface of any suitably-woven fabric by heated iron rollers in a calender. The coats are then cut out and the various pieces put together, without sewing, by some solvent, such as turpentine, which makes the edges adhere. They are afterward heated in the vulcanizing chamber. Both coats and shoes of this material have, however, the objectionable property of preventing the escape of moisture from the skin. Belting, buffers, wheel-tires, washers, valves, pipes, fire-hose, and other engineering appliances, form a large branch of the India-rubber trade. For medical and surgical purposes, many articles are made of this material. Of such an apparently trivial matter as vulcanized India-rubber thread, one English firm turns out about 3,000 lbs. per day, and another single small article—tobacco pouches—is made in another factory at the rate of 3,000 per day.

Hard vulcanized India-rubber, termed vulcanite, and sometimes ebonite, is made into a great many small articles, e.g., combs, chains, bracelets, boxes, pen-holders, paper-knives, knife-handles, buttons, etc., as a substitute for materials like horn, bone, ivory, and jet. As in the case of these substances it is formed into various objects by molding, cutting, carving, polishing, and other processes. Vast numbers of these articles are now sold, but some time must yet elapse before the quality of this material is thoroughly tested. The black color of vulcanite ornaments has still a tendency to turn gray, but the brittleness which was a fault of combs made of it a few years ago, seems to be overcome. With respects to objects of considerable size, vulcanite has been made into furniture, ornamental tiles, and even rails for railroads. A kind of vulcanite is now very largely employed as an insulator in electric cables, experience having shown some objections to gutta percha for this purpose.

There are some useful applications of India-rubber in the liquid or semi-liquid state: thus, when melted at 398° F., and mixed with half its weight of slaked lime, it forms a useful cement or lute, which can be easily loosened, but it will dry and harden if red lead is added. A very tenacious glue is formed by heating India-rubber, coal tar, and gum-shellac together. It forms an ingredient in some special kinds of varnishes, and it also improves the lubricating qualities of mineral oils, when a small quantity is dissolved in them.

Most fatty substances exercise a destructive action on India-rubber, causing it to become first soft, afterward hard and brittle. Often mere traces of fatty oils in the liquids used for dissolving the India-rubber, or such matters in the textile fabrics treated with it, have wrought the destruction of water-proof goods. A like cause has in many cases led to the rapid deterioration of the India-rubber threads in elastic webbing.

Over $100,000,000 worth of manufactures from India-rubber are now turned out from the factories of the country every year, and about half of this total is in the form of boots and shoes. So great is the demand for India-rubber for use in manufacturing that not only has the importation grown from 2,000,000 lbs. in 1862 to over 50,000,000 annually at the present period, but in addition to this the forests of the East Indies are called upon for several million pounds annually of a new substitute for gutta-percha, known as 'gutta-joolatong,' while at the same time the highways and byways of Europe and other countries are ransacked for cast-off rubber manufactures from which the rubber is 'reclaimed' and re-used in conjunction with the new rubber from the forests of Brazil, Africa, and the East Indies.

The industry of importing and 'reclaiming' India rubber for re-use in manufacturing is a comparatively new one, and while it utilizes large quantities of worn-out rubber boots and shoes and other articles of this character from the scrap heaps of the United States, it has only extended to other parts of the world in recent years.

Gutta-joolatong is another comparatively new material which may be used as a substitute for or in conjunction with India-rubber.

INDICAN, n. *ĭn'dĭ-kăn* [from *indigo*]: a colorless substance related chemically to indigo, found in woad, in most plants yielding indigo-blue, and in human urine.

INDICATE, v. *ĭn'dĭ-kāt* [L. *ĭndĭcātus*, pointed out—from *in*, into; *dĭcārĕ*, to proclaim or make known]: to point out; to discover; to direct the mind to a knowledge of something that is not present or has not occurred; to show by symptoms, as a disease. IN'DICANT, n. *-dĭ-kănt*, that which indicates or points out. IN'DICATING, imp. IN'DICATED, pp. INDICATOR, n. *ĭn'dĭ-kā-tĕr* [F. *indicateur*]: he who or that which points out; a gauge or diagram for showing the effective working power of an engine; a water-gauge in a steam-engine; in *anat.*, the muscle which extends the forefinger. IN'DICA'TION, n. *-shŭn* [F.—L.]: token; symptom; that which serves to discover. IN'DICA'TORY, a. *-tĕr-ĭ*, serving to show or make known. INDICATIVE, *ĭn-dĭk'ă-tĭv* [F. *indicatif*—from L. *indĭcātīvus*]: serving to show or make known; the form of the verb which simply affirms or denies, or asks a question. INDIC'ATIVELY, ad. *-lĭ*.—SYN. of 'indicate': to show; exhibit; display; disclose; demonstrate; evince; manifest; argue; mark; signify; denote;—of 'indication': sign; mark; note; in *OE.*, discovery; information, explanation.

INDICOLITE, n. *ĭn'dĭ-kō-līt* [*indigo*, and Gr. *lithos*, a stone]: an indigo-blue variety of tourmaline.

INDICT, v. *ĭn-dīt'* [OF. *indicter*—from L. *indictus*, declared or made known—from *in*, in or on; *dĭcĕrĕ*, to speak

or say (see INDITE)]: to accuse or charge with a crime or misdemeanor, formally or in writing, as by a grand jury. INDICT'ING, imp. INDICT'ED, pp. INDICT'ER, n. *-ĕr,* one who. INDICT'ABLE, a. *-ă-bl,* that may be indicted. INDICT'MENT, n. *-dīt'mĕnt,* a formal charge; the paper or parchment containing the charge. INDICT'EE, n. *-ē,* the person indicted. *Note.*—The spelling of INDICT is Latin, while its pronunciation shows clearly that the word comes to us from the French.

INDICTION, n. *ĭn-dĭk'shŭn* [F. *indiction,* an indiction —from L. *indictĭōnem,* a declaration or imposition of a tax—from *in,* in or into; *dīcō,* I proclaim—*lit.,* the laying on of an impost or tax]: period or cycle of 15 years. INDICTIVE, a. *-tĭv,* proclaimed; declared.—The origin of *Indiction* as a chronological period is not known. Connecting the original meaning of the word, 'the imposition of a tax,' with its signification in chronology, several writers have propounded theories explanatory of its origin, none of which are supported by any evidence. It began to be used in reckoning time, chiefly by ecclesiastical historians, during the life of Athanasius; it was afterward adopted by the popes, who continue to use it, and through whose influence it came to be so generally employed during the middle ages, that the dates of charters and public deeds of this era are expressed in indictions as well as in years of the Christian era. The time from which reckoning by indictions began is, according to some, 312, Sept. 15; according to the Greeks of the Lower Empire, 312, Sept. 1; but when this method was adopted by the popes, it was ordered to be reckoned as beginning 313, Jan. 1. The latter only is now used, and is called the *Papal Indiction.* If we reckon backward to the beginning of the Christian era, it will be seen that 1 A.D. does not correspond to the 1st, but to the 4th year of an indiction—hence, *if to any given year of the Christian era 3 be added, and the sum divided by* 15, *the remainder will give the position of that year in an indiction*—e.g., 1880 was the 8th year of an indiction.

INDICT'MENT: accusation or charge in writing against a person or persons of a crime or misdemeanor emanating from a legally constituted grand jury. Where a charge is laid by a citizen or official against an individual, corporation, or a thing (as constituting a public nuisance), and evidence is produced to substantiate it, the jurors *indict;* but where the jurors of their own volition or by direction of a court seek out evidence themselves against a person or a thing they *present* the person or thing. With this technical difference between the two acts, it will at once appear that while every indictment is a presentment, not every presentment is an indictment. In the United States the exact form of drawing indictments is usually declared by state statutes; and these are so explicit that the use of certain words and expressions is mandatory, viz.: 'traitorously,' in a charge

of treason; 'feloniously,' in felony; 'burglariously,' in burglary; 'took and carried away,' in larceny; 'maim,' in mayhem, etc., and in the conclusion of the indictment 'against the peace and dignity of the' city, state, or nation, and 'contrary to the form of the statute in such case made and provided.' An indictment consists of three parts; the *caption* which records the time, place, and circumstances of the finding; the *statement* which details the offense charged and presents the facts connected with it with extreme particularity; and the *conclusion* which must be drawn in the phraseology of the state statute, the evidence in support of the charge is wholly or largely *ex-parte,* or from the side of the person or persons seeking the indictment. If the grand jury or a majority of them believe from the statement of facts and the evidence laid before them that the accused is guilty as charged, the foreman of the jury indorses on the back of the indictment 'a true bill,' and the indictment is then said to be 'found.' An indictment charges a particular offense, and if the offense consisted of separate actions, each one must be specifically set forth, and such are known as 'counts'; conviction may be had on one or more, or on all the counts. An error, even verbal in drawing an indictment, often renders the whole presentment defective and invalid, and causes the dismissal of the complaint by the court. When the indictment is completed it is handed to the clerk of the court having jurisdiction and entered on the docket for a hearing. Modern practice gives the person, corporation, or representative (owner, lessee, or agent) of the thing indicted a right to a copy of the indictment; but under old English practice he was either not allowed to obtain detailed knowledge of it, or was merely permitted to hear it read through before pleading to it.

INDIFFERENT, a. *ĭn-dĭf-fĕr-ĕnt* [F. *indifférent*—from L. *indiffĕren'tĕm*, indifferent, careless—from *in*, not; *diffĕrō*, I differ]: not inclined to one more than another; neither good nor bad in reference to quality; feeling no interest or anxiety; impartial; passable. INDIF'FERENTLY, ad. *-lĭ*, without distinction or preference; equally; impartially; in a neutral state; tolerably. INDIF'FERENCE, n. *-ĕns* [F.], or INDIF'FERENCY, n. *-ĕn-sĭ*, carelessness, unconcern, neutrality of mind between persons or things; impartiality. INDIF'FERENTISM, n. *-ĭzm*, system or state of indifference; in *metaphysics*, theory of a school of philosophers, that the human will acts in utter indifference to all motives, and chooses merely as a judge decides; opposite to determinism (q.v.). These philosophers distinguish the human will from the human nature. See FREE-WILL; WILL.—SYN. of 'indifference': apathy; insensibility; negligence; insignificance; passableness; mediocrity; impartiality; unconcernedness; neutrality; inattention; disregard.

INDIGENOUS, a. *ĭn-dĭj'ĕ-nŭs* [L. *indĭgĕnus*, native; *ĭndigĕna*, a native, born and bred in the same country or town: It. *indigeno:* F. *indigène*]: born in a country, applied to persons; not exotic or introduced, applied to plants.

INDIGENT, a. *ĭn'dĭ-jĕnt* [F. *indigent*—from L. *indĭgen'tem*, needy, poor: It. *indigente*]: poor; needy; destitute; necessitous. IN'DIGENTLY, ad. *-jĕnt-lĭ*. INDIGENCE, n. *ĭn'dĭ-jĕns* [F.], or IN'DIGENCY, n. *-jĕn-sĭ*, want; poverty.—SYN. of 'indigence': penury; destitution; need; pauperism.

INDIGESTED, a. *ĭn'dĭ-jĕs'tĕd* [*in*, not, and *digested:* F. *indigeste*, undigested—from L. *indĭges'tus*, confused, disordered]: not regularly disposed; not formed or shaped; not changed or prepared in the stomach for nourishing the body; not well considered or matured. INDIGESTIBLE, a. *ĭn'dĭ-jĕs'tĭ-bl*, not easily digested; not to be patiently endured. IN'DIGES'TIBLY, ad. *-blĭ*. IN'DIGEST'ION, n. *-jĕs'tyŭn* [F.—L.]: a painful or imperfect change of food in the stomach while preparing for the nourishment of the body; want of due digestion; dyspepsia.

INDIGEST'ION, or DYSPEP'SIA: term vaguely applied to various forms of disease of the stomach or of the small intestines in which the natural process of digesting and assimilating the food is deranged.

The symptoms of indigestion are not constant in all cases. There is often *anorexia* (or want of appetite), but occasionally the appetite is excessive, and even ravenous. Nausea not unfrequently comes on soon after a meal; while in other cases there is no nausea, but after the lapse of a couple of hours, the food is vomited, the vomited matters being very acid, and often bitter, from the admixture of bile. In severe cases the vomiting has been known to occur after every meal for several months. Flatulence, relieving itself in eructations, is one of the standard symptoms of this affection, the gas that gives rise to this symptom being sometimes evolved from undigested matters in the stomach, and sometimes being apparently secreted by the walls of that viscus. It is very apt to occur in dyspeptic patients if they have fasted rather longer than usual. *Cardialgia* (popularly known as *heartburn*), *Pyrosis* (q.v.), or water-brash, and *Gastrodynia* (commonly designated *spasm* or *cramp* of the stomach, and coming on at uncertain intervals in most severe paroxysms), are less common symptoms of indigestion.

The treatment of indigestion is more dietetic than medicinal. The quantity of food which can be dissolved by the gastric juice and intestinal fluids being limited (see DIGESTION), care should be taken that this quantity is not exceeded; moreover, the meals should not succeed each other too rapidly. Mr. Abernethy, who was a great authority on this subject, laid great stress on the

principle, that the stomach should have time to perform one task before another was imposed upon it, and he always recommended his patients to allow six hours to intervene between any two meals. As to the nature of the food best suited to dyspeptic persons—a mixture of well-cooked animal and vegetable food is in general more easily digested than either kind exclusively. Mutton, fowls, and game are the most digestible kinds of animal food; and pork and all cured meats, such as salted beef, ham, tongue, etc., should be avoided. Raw vegetables, such as salads, cucumbers, etc., also must be prohibited. In most cases, dyspeptic persons would probably do well to avoid all stimulating drinks; but in some cases, a little cold, weak brandy and water, or a glass of old sherry, or a little bitter ale, may be taken with advantage. But on all points of eating and drinking a sensible patient must be influenced mainly by his own experience. The unquestionable benefit which dyspeptic patients often derive from a visit to a hydropathic establishment is due perhaps not so much to any specific action of the water as to the well-regulated diet, the withdrawal of the mind from personal cares, and the change of scene. A six weeks' or two months' tour among the mountains, or a voyage of some length, will in the same way often do a dyspeptic patient more good than any amount of medication at home.

Treatment of some of the most urgent individual symptoms.—Loss of appetite may be remedied by the use of bitters, such as quinine, gentian, chiretta, etc., or of mineral acids, or of both combined. Nausea and vomiting may be treated with hydrocyanic acid, chloroform, and creosote in very small doses: these dangerous drugs should be taken only under medical advice. Two or three drops of diluted hydrocyanic acid in an effervescent draught are often an effectual remedy. In intense vomiting, the amount of food taken at a time must be reduced to the lowest possible limit. A tablespoonful of milk, mixed with lime-water, will sometimes remain on the stomach after all other kinds of food have been rejected. There is no better remedy for flatulence than peppermint-water; if it fails, a drop of cajeput oil on a lump of sugar may be tried. When the eructations are attended with an odor of rotten eggs—that is to say, when sulphuretted hydrogen is evolved from the decomposition of matters in the stomach—an emetic is the best cure. The remedies for the pain in the stomach vary with the character of the pain; bismuth, nitrate of silver, and opium are often serviceable, but should not be taken without advice. A teaspoonful of the aromatic spirit of ammonia in a wineglass of camphor mixture, often gives instantaneous relief; but this is of a class of medicines which cannot be commended, on account of general effects.

INDIGIRKA, *ĭn-dē-gĭr'kâ:* river of Siberia, in the

govt. of Jakutsk, rises in the Yablonoi or Stavonoi Mountains, and after a northerly course, estimated at 750 m., through a frozen desert past a few villages, falls into the Arctic Ocean, lat. 71° n., and long. 150° east.

INDIGN, a. *ĭn-dīn'* [F. *indigne*, unworthy—from L. *indignus*—from *in*, not; *dignus*, worthy]: in *OE.*, unworthy; undeserving; disgraceful. INDIGN'LY, ad. *-lĭ*, in an indign manner; unworthily.

INDIGNANT, a. *ĭn-dĭg'nănt* [L. *indignan'tem*, angry, disdaining—from *in*, not; *dignus*, worthy: F. *indigne*, unworthy]: affected at once with anger and disdain. IN DIG'NANTLY, ad. *-lĭ*. IN'DIGNA'TION, n. *-nā'shŭn* F.—L.]: anger mingled with disdain; strong disapprobation and disgust at flagitious conduct; extreme anger; effects of anger. INDIG'NITY, n. *-nĭ-tĭ* [L. *indignĭtas*, unworthiness: F. *indignité*]: incivility or injury accompanied with insult; contemptuous rudeness; an affront; an outrage. INDIG'NIFY, v. *-nĭ-fī* [L. *făcĭō*, I make]: in *OE.*, to treat unbecomingly or disdainfully: see DIGNIFY.—SYN. of 'indignation': resentment; anger; ire; wrath; fury; rage.

INDIGO, n. *ĭn'dĭ-gō* [F. *indigo;* It. *indaco;* Sp. *indico* —from L. *indĭcum*—from *indĭcus* (Gr. *indĭkon*), Indian]: a beautiful blue dye, obtained from the leaves of certain plants; the two most common are *Indĭgŏf'ĕrā tinctōrĭā*, and *I. cærūlĕā*, ord. *Leguminōsæ*, sub-ord. *Papĭlĭōnācĕæ*. INDIGOGEN, n. *ĭn'dĭ-gō-jĕn* [Gr. *gennăō*, I produce]: white or deoxidized indigo. INDIGOMETER, n. *ĭn'dĭ-gŏm'ĕ-tĕr* [Gr. *metron*, a measure]: an instr. for testing indigo. IN'DIGOM'ETRY, n. *-trĭ*, the art of testing indigo. IN'DIGOT'IC, a. *-gŏt'ĭk*, applied to an acid formed from indigo. IN'DIGOTINE, n. *-tēn*, pure indigo-blue.

IN'DIGO: important vegetable dyestuff, yielding a beautiful blue and very durable dye, the basis also of the best black dye in woolen cloths. It has been used in India from a very early period, and was imported thence by the ancient Greeks and Romans, but was lost to Europe during great part of the middle ages—though the cultivation of the plant and preparation of the dye were described by Marco Polo in the 13th c.—until reintroduced by the Dutch about the middle of the 16th c. Its use in England, France, and Saxony was then for a considerable time prevented by a strong prejudice against it, arising from the difficulty experienced in fixing the color. Since this has been overcome, the cultivation of plants, producing indigo, long confined to India, has extended to many other tropical and subtropical countries, as Egypt, W. Indies, Mexico, Brazil, etc. These plants generally belong to the genus *Indigofera*, of nat. ord. *Leguminosæ*, sub. ord. *Papilionaceæ*. The keel of the corolla is furnished on both sides with an awl-shaped spur. The species of this genus number at least 150, and are natives of almost all tropical and subtropical countries. Of these, *Indigo tinctoria* is the species most culti-

vated in India. It is a half-shrubby plant, 2-3 ft. high, with pinnate leaves, which have five or six pair of long-obovate, dull, bluish-green leaflets, and racemes of axillary pale red flowers.

The province of Tinnevelly produces much indigo. Bengal produces, on an average, about nine million lbs. annually. The sum which Europe annually pays for indigo is estimated at eight or ten millions of pounds sterling.

Indigo is obtained from plants of other genera, particularly from *Wrightia tinctoria* (nat. ord. *Apocynaceæ*), E. Indies; *Baptisia tinctoria* (nat. ord. *Leguminosæ*), N. America, which yields Indigo of pale color and inferior quality; *Tephrosia tinctoria* (nat. ord. *Leguminosæ*), Malabar; and *T. Apolline*, Egypt and Nubia; *Marsdenia tinctoria* (nat. ord. *Asclepiadaceæ*), in Sylhet; and *Polygonum tinctorium* and *P. Chinense* (nat. ord. *Polygonaceæ*), China and Japan.—*Wrightia tinctoria* is a large shrub, indigenous to great part of India and to Ceylon, yielding indigo of the finest quality, and is recommended by Dr. Roxburgh for cultivation, as less dependent than the common indigo plants on rain and irrigation. It grows very freely, and throws out shoots rapidly on their being cut away. In times when E. Indian indigo was not known, or was brought to Europe only in small quantity, the same dyestuff was obtained from WOAD (q.v.).—A coarse kind of Indigo called Bastard Indigo, was at one time made in N. America, from the young shoots of *Amorpha cœrulea*.

The Manufacture and Applications of Indigo.—The indigo plant, in its general appearance, is not unlike the lucerne of our fields. The seed is sown in drills about 10 inches apart, and soon makes its appearance above ground, when it requires incessant care to keep the weeds down, which otherwise would soon choke so tender a crop. In about three months the plants begin to flower, and are then cut down, but soon shoot up again, and yield a second cutting, sometimes a third, the same year. Formerly indigo was carefully dried after being cut, and even fire heat was sometimes used for the purpose, but now—at least in India—the practice is abandoned, and it is found in every respect better to use the plant while fresh and green. The first process is to pack a large vat full of the freshly cut indigo; heavy wooden beams are placed on the top to press it down; and water is then let into the vat, enough just to cover it. Being left in this state ten to twelve hours, fermentation is set up, and much gas disengaged, the water becoming a light-green color. The green liquor is then run off into the second vat, which is placed below the level of the first, in which, while the fermentation process is being repeated on a fresh supply in the first vat, it is violently agitated by being beaten with poles: this causes the *grain*, as it is called, to separate and the green matter

suspended in the liquor becomes blue and granular. When this operation is sufficiently advanced, the contents of the vat are allowed to settle, and the sediment is then run into the third vat, which is below the level of the second; from which it is pumped into a boiler. The boiler is slightly heated, and then allowed to stand for a few hours, during which time the indigo settles down, and as much clear water as possible is drawn off from above it. The boiler is then again heated, and this time up to the boiling-point; after which its contents are allowed to run on to a frame of wood, lined with 'long-cloth' sheeting, where they remain to drain till about the consistence of very thick cream, when they are removed, and subjected to very heavy screw pressure; and when as hard and dry as ordinary soap, are cut by brass wire on a frame into cubes, about three inches square; and these are laid out so as not to touch each other, on the shelves of the drying-house. Finally, the cakes are cleaned, one by one, and tightly packed in boxes for the market.

This dye is, without doubt, the oldest in use; the Greeks and Romans obtained a knowledge of its uses from India, where its employment has been very general for a great length of time. Much obscurity involves its early use, in consequence of the variation in its name; for instance, the Tamools of India call the plant *Averie*, and the dye itself *Neelum;* in Sanskrit, the plant is *Vishashodanie*, and the dye *Nīlī* and *Nilĭnī*, whence the *Anil* of the Portuguese. The Malays call the dye *Taroom*, and the Arabs, *Neel.*

Commercially speaking, Indigo may be said to be the produce of India and Central America, as these are the only localities which supply the recognized form of the article. In India, chief seat of the manufacture, Bengal is the most important district. The total quantity received in Great Britain 1876 was more than 88,000 cwts. —a vast quantity, when it is borne in mind with what difficulty it is cultivated and manufactured. When pure, indigo has a rich, dark, blue color, almost purple; it is in small cubes or parts of cubes, and its fracture shows a tendency to break up into square pieces, and indicates cracks in its substance, often filled up with a film of whitish efflorescence, probably the lime used in precipitating it. It has neither taste nor smell, and its specific gravity is about 1.50; if rubbed with any hard substance, it gives a streak with a bright coppery lustre. The varieties recognized in commerce are (1) Bengal, which, from the care taken in its preparation, and the large scale on which it is made in that district, is the best; and its various gradations of quality, ten in number, varying from about $2.16 to about $1.20 per lb., are always kept distinct. In other sorts, they are usually much mixed. (2) Madras and Kurpah; (3) Oude; (4) Manilla; (5) Java; (6) S. American. The last is packed in serons or cases of dried ox-skin, and its qualities are distinguished

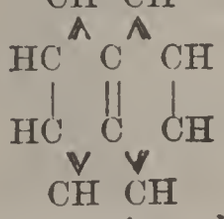
as follows: (1) Flores; (2) Sobres; and (3) Cortes; an the others are in wooden chests, containing about 250 lbs. each.

For dyeing purposes the indigo is ground up with water and treated with calcium hyposulphite, CaS_2O_4; this reduces it to indigo-white (see below), which is soluble. The goods are dipped in the solution and then exposed to air, the oxygen of which gradually changes the indigo-white to indigo.

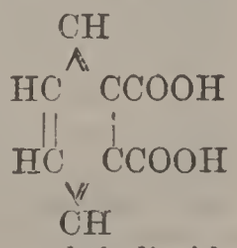
Chemically, the changes involved in the manufacture and use of indigo are of considerable importance. The plant leaves contain a glucoside termed *indican*, $C_{14}H_{17}O_6N.3H_2O$, and also an enzyne (q.v.), these are dissolved out simultaneously by the water. The enzyne then decomposes the indican into glucose (grape sugar), $C_6H_{12}O_6$, and *indoxyl*, $C_6H_4{<}^{NH-}_{C(OH)}{>}CH$, into indigo, $C_6H_4{<}^{NH}_{CO}{>}C{:}C{<}^{NH}_{CO}{>}C_6H_4$. In dyeing by means of indigo the latter is reduced to indigo-white,

$$C_6H_4{<}^{C(OH)}_{NH-}{>}C.C{<}^{C(OH)}_{-HN}{>}C_6H_4,$$

which degenerates indigo on exposure to air. Indigo can be prepared in the laboratory in a number of different ways which establish the formulæ given above. It is manufactured in very large quantities by the following process: Naphthalene,



from coal tar, is oxidized by means of *fuming* sulphuric acid and a little mercury, in phthalic acid,



ammonia changes this substance to phthalimide, $C_6H_4{<}^{CO}_{CO}{>}NH$, which is then transformed to anthranillic acid, $C_6H_4{<}^{NH_2}_{COOH}$. This acid and chlorecetic acid, $ClCH_2COOH$, unite to form phenylglycine-orthocarboxylic acid, $C_6H_4{<}^{NHCH_2COOH}_{COOH}$, which when fused with sodium hydroxide, yields indoxyl, $C_6H_4{<}^{NH-}_{C(OH)}{>}CH$, which latter, on exposure to air, is transformed into indigo (see above). This manufacture of artificial indigo is probably the most important recent event in the domain of technical chemistry. Not only does it provide a market for the otherwise comparatively useless naphthalene, but it permits of a reduction in the price of indigo, so that the cultivation of the plant is already restricted and would, doubtless, be abandoned altogether were it not for the fact that 'synthetic,' or artificial indigo, is practically pure, whereas the 'natural' vegetable contains small quan-

tities of impurities, consisting of complicated substances known as 'indigo-gluten,' 'indigo-brown' and 'indigo-red'; these, especially the last named, modify somewhat the color produced on dyed fabrics by the pure indigo, and these modifications are more pleasing to the eye than the shades obtained from the pure indigo. Consequently, the indigo plant industry depends for its existence on the presence, in their product, of these impurities.

IN'DIGO BIRD (*Cyanospiza cyanea*): N. American bird of the Finch family (*Fringillidæ*), native of the United States, as far n. as the Missouri, which it visits in summer, and of Central America, where it spends the winter. It is about 5½ inches in length, of a beautiful blue color, variously tinged and shaded, the lores and angles of the chin velvet black. It frequents open places on the edges of woods, and delights to sit singing on the top of a high tree. Its song is very sweet. It is easily domesticated, and is much in request as a cage-bird.

INDIRECT, a. *ĭn'dĭ-rĕkt'* [F. *indirect*—from L. *indīrec'tus*, not direct; *in*, not, and Eng. *direct*]: not direct; circuitous; not straightforward; unfair; dishonest. IN'DIRECT'LY, ad. *-lĭ*. IN'DIRECT'NESS, n. deviation from an upright or straightforward course; unfairness. INDIRECTION, n. *ĭn'dĭ-rĕk'shŭn*, in *OE.*, oblique means; dishonest practice.

INDIRECT-ACTING ENGINE: one in which the motion of the piston is communicated to the crank-shaft by means of intermediate levers. In the beam-engine, the connection between the piston and the connecting rods consists of a beam, the oscillating point of which is placed midway between the two rods. They are chiefly employed for pumping purposes, and for driving paddle-wheel steamers. Other than in this limited field, they are becoming practically obsolete.

INDIRECT DAMAGES: claims for damages not directly inflicted by the illegal act complained of, but by other causes themselves due to that act. The great historical case is that of the United States claim for many hundreds of millions of dollars' worth of loss, resulting from Great Britain's bad faith or carelessness in letting the *Alabama* (see ALABAMA) escape from her ports to prey on our commerce. It was alleged that aside from the actual loss to our shipping and cargoes, we had been damaged to a far greater extent by the resultant effects, chiefly of three sorts: (1) The prolongation of the Civil War due to the encouragement given to the South and the straitening of the North. (2) The destruction of commercial lines and relations, which took long to recover after the war. (3) The raising of the rates of marine insurance. As these claims exceeded the cost of a war plus the indemnity we should have exacted if victorious, Great Britain refused to consider them; and the commission threw them out altogether as contrary to international law.

INDIRECT EVIDENCE: a term used to denote that kind of evidence that, while it does not establish the fact in question, furnishes a presumptive proof in its favor.

INDIRECT TAXES: taxes levied on commodities from the producer or importer only, the share of the taxes to the consumer being included in the price he pays for the commodities.

INDIRECT VISION: when attention is directed to objects upon which the eyes are not directly focused, the resultant visual consciousness is termed indirect vision. The outer parts of the retina are defective in color vision and the appreciation of space relations is highly imperfect. Under ordinary conditions the eyes are turned so as to permit the rays of light coming from the object looked at to fall on the fovea, or central part of the retina, where vision is most accurate for practical purposes.

INDISCERNIBLE, a. *ĭn'dĭz-zėrn'ĭ-bl* [*in,* not, and *discernible*]: not visible or perceptible; indistinguishable. IN'DISCERN'IBLY, ad. *-blĭ.* IN'DISCERN'IBLENESS, n. *-bl-nĕs.*

INDISCERPTIBLE, a. *ĭn'dĭs-sėrp'tĭ-bl* [L. *in,* not; *discerptus,* plucked or torn to pieces]: that cannot be destroyed by dissolution or separation of parts. IN'DISCERP'TIBLY, ad. *-blĭ.*

INDISCREET, a. *ĭn'dĭs-krēt* [*in,* not, and *discreet:* F. *indiscret*—from mid. L. *indiscrētus*]: imprudent; inconsiderate; rash. IN'DISCREET'LY, ad. *-lĭ.* IN'DISCRE'TION, n. *-krĕsh'ŭn* [F.], or IN'DISCREET'NESS, n. want of discretion; imprudence.—SYN. of 'indiscreet': heedless; incautious; inconsiderate; injudicious; hasty.

INDISCRIMINATE, a. *ĭn'dĭs-krĭm'ĭ-nāt* [*in,* not, and *discriminate:* L. *indiscrimĭnātim,* without distinction—from *in,* not; *discrimĭnātim,* distinctly]: without making any distinction; promiscuous; confused. IN'DISCRIM'INATELY, ad. *-lĭ.* IN'DISCRIM'INATING, a. not making any distinction. IN'DISCRIM'INA'TION, n. *-shŭn,* the quality of being indiscriminate; want of distinction. IN'DISCRIM'INATIVE, a. *-tiv,* making no distinction.

INDISPENSABLE, a. *ĭn'dĭs-pĕn'să-bl* [F. *indispensable: in,* not, and Eng. *dispensable*]: that cannot be omitted or spared; absolutely necessary. IN'DISPEN'SABLY, ad. *-blĭ.* IN'DISPEN'SABLENESS, n. *-bl-nĕs,* or IN'DISPEN'SABIL'ITY, n. *-bĭl'ĭ-tĭ,* state of not being able to be spared or dispensed with.

INDISPOSE, v. *ĭn'dĭs-pōz* [F. *indisposer,* to indispose; OF. *indispos,* sickly, ill-disposed: *in,* not, and Eng. *dispose*]: to disincline; to make averse to; to disorder slightly, applied to health. IN'DISPOS'ING, imp. IN'DISPOSED', pp. a. *-pōzd',* averse to; unwilling; not in perfect health. INDISPOSITION, n. *ĭn-dĭs'pō-zĭsh'ŭn* [F.—L.]: aversion; dislike; slight disorder.

INDISPUTABLE, a. *ĭn-dĭs'pū-tă-bl* [F. *indisputable*—from L. *in,* not; *dispŭtābĭlĭs: in,* not, and Eng. *dis-*

putable]: not to be disputed; that is, not to be questioned; undeniable; incontestable. INDIS'PUTABLY, ad. *-blĭ.* INDIS'PUTABLENESS, n. *-bl-nĕs.*—SYN. of 'indisputable': incontrovertible; indubitable; unquestionable; irrefragable; positive; certain; undoubted; evident; clear; plain.

INDISSOLUBLE, a. *ĭn-dĭs'sō-lū-bl* [F. *indissoluble*—from L. *indissŏlū'bĭlĭs: in,* not, and Eng. *dissoluble*]: not capable of being dissolved; not separable; firm; binding or subsisting perpetually. INDIS'SOLUBLY, ad. *-blĭ,* in a manner resisting all separation or dissolving power. INDIS'SOLUBLENESS, n. *-bl-nĕs,* or INDIS'SOLUBIL'ITY, n. *-bĭl'ĭ-tĭ* [F. *indissolubilité*]: the quality of being not capable of being dissolved or melted; binding force.

INDISTINCT, a. *ĭn'dĭs-tĭngkt'* [F. *indistinct*—from L. *indistinc'tus: in,* not, and Eng. *distinct*]: not plainly marked; obscure; confused; faint; imperfect. IN'DISTINCT'LY, ad. *-lĭ.* IN'DISTINC'TION, n. *-tĭngk'shŭn,* confusion; uncertainty; also IN'DISTINCT'NESS, n. *-nĕs.*—SYN. of 'indistinct': uncertain; undefined; undistinguishable; vague; indefinite; ambiguous.

INDISTINGUISHABLE, a. *ĭn'dĭs-tĭng'gwĭsh-ă-bl* [*in,* not, and *distinguishable*]: that cannot be distinguished or separated.

INDITE, v. *ĭn-dīt'* [OF. *endicter*—from L. *indictus,* published, announced—from *in,* into; *dīcĕrĕ,* to speak: mid. L. *indictārĕ,* to accuse—from L. *dictārĕ,* to declare, to dictate (see INDICT)]: to direct, suggest, or prompt what is to be uttered or written; to compose; to commit words to writing. INDI'TING, imp. INDI'TED, pp. INDI'TER, n. one who. INDITE'MENT, n. act of inditing. *Note.*—There can be no doubt that the meaning of the mid. L. words *dictārĕ,* to dictate; *indicārĕ,* to point out, and *indictārĕ,* to accuse, have influenced the meanings of *indite;* and the influence of *dĭcārĕ* cannot be separated from that of *dīcĕrĕ* in the consideration of both *indite* and *indict.*

INDIUM, n. *ĭn'dĭ-ŭm* [formed from *indigo,* referring to its indigo-colored lines in the spectrum]: a rare metallic element discovered in 1863 by spectroscopic analysis of zinc-blende. It has been isolated, but only in small quantities. It is of a silver white color, soft, and marks paper like lead; specific gravity 7.421, at 16.8°. The spectrum of indium exhibits two characteristic lines, one violet and another blue line B; besides these two, fainter blue lines are visible if the burner in which the metal is volatilized be fed with hydrogen instead of coal gas.

INDIVIDUAL, n. *ĭn'dĭ-vĭd'ū-ăl* [F. *individuel;* It. *individuale,* individual—from L. *indivĭdŭŭs,* not divided or separated—from *in,* not; *dīvĭdo,* I divide]: one incapable of division or separation; a single one; a single

person; a single animal, plant, or thing: ADJ. single. IN'DIVID'UALLY, ad. *-lĭ*, separately; with a separate and distinct existence; inseparably. IN'DIVID'UAL'ITY, n. *-ĭ-tĭ* [F. *individualité*]: separate or distinct existence. In *nat. history*, there is some debate as to what constitutes individuality; similarly in metaphysical science; and it is to be conceded that in a class of cases individuality is a relative term whose use must be accompanied with explanation. It denotes also a character or property peculiar to an individual; distinctive character; also a phrenological organ, supposed to indicate originality and independence. IN'DIVID'UALIZE, v. *-ăl-īz*, to distinguish from others; to invest with the character of individuality; to particularize. IN'DIVID'UALIZING, imp. IN'DIVID'UALIZED, pp. *-īzd*. IN'DIVIDUALIZA'TION, n. *-ăl-ī-zā'shŭn*, the act of individualizing; the state of being individualized. IN'DIVID'UALISM, n. *-ăl-ĭzm*, the quality of being individual; an excessive or undue attachment to the interests of individuals; self-interest. IN'DIVID'UATE, v. *-vĭd'ū-āt*, to make single; to distinguish from others. IN'DIVID'UATING, imp. IN'DIVID'UATED, pp. IN'DIVID'UA'TION, n. *-ā'shŭn*, the act of making single; that which makes an individual.—SYN. of 'individual, a.': particular; solitary; undivided; distinctive; indivisible.

INDIVIDUAL, IN PHILOSOPHY: the fact that one thing may be distinguished from all others gives the word individual its meaning. Whether the distinction is only relative or is absolute is disputed among philosophers. The problem arises out of the difficulty of thinking of any distinctive character of an individual, except its location in space or time, without using general concepts. For example, Socrates is thought of as wise, a Greek, with certain colored hair, etc. The descriptive terms are all general. This has led some to doubt the absoluteness of individuality. With Plato the universals alone were real. With Aristotle, on the other hand, reality was found in the concrete individual and the universal stood only for an abstraction. The same problem occurs in medieval times, in the discussion of the relation of God, Trinity and man, and in modern times in the question of the relation of the individual to society. In an organic conception of society, the individual is the center of influence, something which reacts; but is not independent: the individual and society are inseparable. In an ethical view, on the other hand, the individual is independent and free.

INDIVIDUALISM: a regard for and emphasis of the individual. A belief in personal independence and self-sufficiency. In ethics, those doctrines which dwell upon individual welfare rather than social welfare, and determine their standards of conduct by the dictates of individual feeling. Under these views, it is taken for granted

that if each individual seeks his own highest welfare, social welfare will take care of itself. Individualism is opposed to socialism and finds defense in the works of John Stuart Mill and Herbert Spencer. It becomes the duty of the state, under this conception, not to interfere with the individual except when it is necessary to preserve the opportunity for action. The function of the state is regarded as an artificial restraint, while individual initiative is a natural factor in evolution.

INDIVIDUAL PSYCHOLOGY. See PSYCHOLOGY.

INDIVISIBLE, a. *ĭn'dĭ-vĭz'ĭ-bl* [F. *indivisible*—from mid. L. *indivīsĭb'ĭlĭs: in,* not, and Eng. *divisible*]: that cannot be divided, separated, or broken: N. an elementary part or particle. IN'DIVIS'IBLES, n. plu. *-blz;* in *math.,* elements infinitely small, known as points—according to the theory that a volume or mass is composed of an infinite number of planes, a plane of an infinite number of lines, and a line of an infinite number of points: thus the point becomes the atom of mathematics, and is indivisible. The method of infinitesimals (q.v.) is applied to solve the problems which geometricians in the middle ages solved by the method of indivisibles. IN'DIVIS'IBIL'ITY, n. *-bĭl'ĭ-tĭ* [F. *indivisibilité*]: the property of not being separable into parts. IN'DIVIS'IBLY, ad. *-blĭ.*

IN'DO CHI'NA, or FARTHER INDIA, or the IN'DO-CHI'NESE' PENIN'SULA. See ANAM; COCHIN CHINA; COCHIN CHINA, LOWER; BURMAH; SIAM.

INDOCTRINATE, v. *ĭn-dŏk'trĭn-āt* [L. *in,* in; *doctrīnă,* doctrine: F. *endoctriner,* to indoctrinate]: to teach; to instruct in the rudiments or principles of any branch of knowledge. INDOC'TRINATING, imp. INDOC'TRINATED, pp. INDOC'TRINA'TION, n. *-ā'shŭn,* instruction in the rudiments, as of a science; communication of doctrine.

IN'DO-GERMAN'IC LAN'GUAGES. See ARYAN.

INDOLENT, a. *ĭn'dō-lĕnt* [F. *indolent;* It. *indolente*—from mid. L. *indŏlen'tĕm*—from L. *in,* in; *dolērĕ,* to feel pain—*lit.,* free from pain]: habitually idle; indisposed to labor or exertion; slothful; lazy; careless. IN'DOLENTLY, ad. *-lĭ.* IN'DOLENCE, n. *-lĕns* [F.—from L. *indolen'tĭă,* freedom from pain]: habitual or constitutional idleness; laziness; dislike to exertion.—SYN. of 'indolent': idle; inert; sluggish; inactive; listless; inattentive.

INDOMITABLE, a. *ĭn-dŏm'ĭ-tă-bl* [L. *indŏmĭtus,* untamed, that cannot be checked—from *in,* not; *domĭtārĕ,* to tame: F. *indomptable*]: that cannot be subdued; untamable; irrepressible.

INDOORS, a. *ĭn'dōrz* [*in,* and *doors*]: being within the house.

INDORE, *ĭn-dōr′*: Mahratta principality of Hindustan, consists of several detached tracts, some very remote from each other. The country, including all between its extremes, stretches in n. lat. 21° 18′—24° 46′, and in e. long. 74° 39′—76° 26′; aggregate area, 8,075 sq.m. The climate is sultry, the thermometer ranging from 60° to 90° F. in the shade. The territory, as a whole, is traversed from e. to w. by the Nerbudda river, also by the Vindhya Mountains, their loftiest point within its limits being 2,500 ft. above the sea. The revenue is nearly a quarter of a million sterling; and the armed force amounts to about 20,000 men. Besides the capital, the chief towns are Rampûra, Mehadpore, Dhi, Pitland, Mundlaisir, Bhanpûra, and Mhow. Indore is peculiarly the country of the Bheels, one of the wildest and most savage of the aboriginal tribes of India. Total pop. 1,141,184.

INDORE′: capital of the principality of Indore; n. lat. 22° 42′, and e. long. 75° 50′; on the left bank of the Kuthi; about 2,000 ft. above sea-level. This place, mean and insignificant in itself, acquired notoriety in connection with the great revolt of 1857. Though Holkar, the rajah, remained faithful to the British govt., yet his troops mutinied July 1, holding the prince as a prisoner in his own palace, and butchering many Europeans, men, women, and children, in cold blood. Indore is of modern erection, founded 1767; and its original namesake, now Jemnah, is still seen on the opposite bank of the river. Pop. 92,170.

INDORSE, v. *ĭn-dŏrs′*, sometimes less correctly, ENDORSE [OF. *endosser;* Sp. *endorsar*, to write one's name on the back of a bill of exchange—from mid. L. *indorsārĕ*, to place upon the back—from L. *in*, on; *dorsum:* F. *dos*, the back]: to write on the back of any written paper; to transfer or assign by writing one's name on the back of a note or bill of exchange. INDOR′SING, imp. INDORSED, pp. *-dŏrst′*. INDOR′SABLE, a. *-sā-bl*, that may be indorsed. INDOR′SER, n. one who writes his name on the back of a bill of exchange, and thus makes himself liable for its payment. INDORSE′MENT, n. that which is written on the back, as of a bill of exchange; also IN′DORSA′TION, n. *-sā′shŭn*. *Indorsement* is the term generally used to denote the writing of the name of the holder on the back of a bill of exchange, check, or promissory note, on transferring or assigning it to another. Signing the name 'A. B.' alone is a blank indorsement; and if the transferee is named, it is a special indorsement. The usual form is, 'Pay C. D. or order. (Signed) A. B.'; or 'Pay to the order of C. D. (Signed) A. B.' When personal liability is to be avoided, the words 'without recourse' are added. The word indorsement is used frequently also in law, to denote any matters written or indorsed on the back of writs or deeds, e.g., on declarations, on writs of summons, etc. IN′-

DORSEE', n. *sē*, the person to whom a note or bill of exchange is indorsed.

INDORSED', or ENDORSED', or ADDORSED', in Heraldry: terms applied to two animals placed back to back. Two keys, two wings, etc., also may be indorsed, and a pelican is drawn always with his wings indorsed.

INDRA, n. *ĭn'drä* [from Sanskrit *id*, which probably meant 'to see, to discover,' hence literally, 'he who sees or discovers,' scil., the doings of the world; another derivation makes the word mean literally 'giver of rain']: one of those Hindu deities that were worshipped especially in the Vedic period of the Hindu religion, but had great legendary popularity also in the Epic and Purânic periods (see INDIA, *Religion*). In that class of Rig-Veda hymns which there is reason to deem the oldest portion of Vedic poetry, the character of Indra is that of a mighty ruler of the bright firmament, and his principal feat is the conquest of the demon *Vr'itra*, a symbolical personification of the cloud which obstructs the clearness of the sky, and withholds the fructifying rain from the earth. In his battles with Vr'itra, he is therefore described as 'opening the receptacles of the waters,' as 'cleaving the cloud' with his 'far-whirling thunderbolt,' as 'casting the waters down to earth,' and 'restoring the sun to the sky.' He is, in consequence, 'the upholder of heaven, earth, and firmament,' and the god 'who has engendered the sun and the dawn'—the *Jupiter Pluvius* of India, the god present more often than any other to the minds of Indian worshippers. And since the atmospherical phenomena personified in this conception are ever and ever recurring, he is 'undecaying' and 'ever youthful.' All the wonderful deeds of Indra, however, are for the benefit of the good only, which in the language of the Veda means the pious men who worship him in their songs, and invigorate him with the offerings of the juice of the Soma plant (see INDIA, *Religion*). He is therefore the 'lord of the virtuous,' and the 'discomfiter of those who neglect religious rites.' Many other epithets illustrate the same conception. It is on account of the paramount influence which the deeds of Indra exercise on the material happiness of man, that this deity occupies a foremost rank in the Vedic worship, and that a greater number of invocations are addressed to him than to any of the other gods. But to understand the gradual expansion of his mythical character, and his ultimate degradation to an inferior position in the Hindu pantheon of a later period it is necessary to bear in mind that, however much the Vedic poets call Indra the protector of the pious and virtuous, he is in their songs essentially a warlike god, and gradually endowed by imagination, not only with the qualities of a mighty, but also of a self-willed king. The legends which represent him in this light seem, it is true, to belong to a later class of the Rig-Veda hymns; but they show that the

original conception of Indra excluded from his nature those ethical considerations which in time changed the pantheon of elementary gods into one of a different stamp. Whether the idea of an incarnation of the deity, which, at the Epic and Purânic periods, played so important a part in the history of Vishnu, did not exercise its history as early as the composition of some of the Vedic hymns in honor of Indra, is matter of doubt. He is, for instance, frequently invoked as the destroyer of cities—of seven, of ninety-nine, even of a hundred cities—and he is not only repeatedly called the slayer of the hostile tribes which surrounded the Aryan Hindus, but some of the chiefs slain by him are enumerated by name. The commentators, of course, turn those 'robbers' and their 'chiefs' into demons, and their cities into celestial abodes; but as it is improbable that all these names should be nothing but personifications of clouds destroyed by the thunderbolt of Indra, it is, to say the least, questionable whether events in the early history of India may not have been associated with the deeds of Indra himself, in like manner as, at the Epic period, mortal heroes were deemed incarnations of Vishnu, and mortal deeds transformed into exploits of this god.

INDRAUGHT, n. *ĭn'drâft:* the flow of sea-water at some depth into a land-locked basin to replace that removed by evaporation or outflow at the surface, as in the Red Sea.

INDRE: river of France, rising on the n. border of the dept. of Creuse, flowing n.w. through the depts. of Indre and Indre-et-Loire, and joining the Loire 17 m. below Tours, after a course of 136 m., through the last 40 of which it is navigable.

INDRE, *ăngd'r:* central dept. of France, formed out of the w. portion of the old province of Berri. It is immediately s. of the dept. of Loir-et-Cher. Area, 2,664 sq.m. It is well watered, the chief rivers being the Indre, the Creuse, and its tributary the Anglin. The surface is mostly flat, and the land generally fertile, producing large crops of wheat and barley. The two principal resources of the dept., however, are its vineyards and its flocks. The principal manufactures are woolen and linen cloths, hosiery, scythes, paper, and porcelain. Iron mines are worked. Pop. 288,788.

INDRE-ET-LOIRE, *ăngd'r-ā-lwâr':* inland dept. of France, formed out of the ancient province of Touraine, n.w. of the dept. of Indre; 2,377 sq.m., of which more than one-half is arable. The dept. is watered by the Loire, the chief river, and by its tributaries, the Cher, the Indre, and the Vienne, all navigable. The Loire, to prevent inundations which otherwise would be frequent and disastrous, is banked in by dikes throughout its course in this dept. (see LOIRE). In the s. the surface is hilly, and either waste or wooded, but in the other

districts it is undulating or flat, and very fertile. Of the products, which include an abundant yield of the ordinary bread-stuffs, wine, of which about 14,000,000 gallons are made in ordinary years, is one of the most important. The chief manufactures are bar-iron, powder, files, woolen cloth, silk, and leather. The dept. is divided into the three arrondissements of Tours, Chinon, and Loches; cap. Tours. Pop. of dept. 335,541.

INDRENCH, v. *ĭn-drĕnsh'* [*in*, not, and *drench*]: in *OE.*, to overwhelm with water; to drown; to drench—which see.

INDRI, n. *ĭn'drī*, or INDRIS: lemurine animal about the size of a large cat, native of Madagascar. See LEMUR.

INDUBITABLE, a. *ĭn-dū'bĭ-tă-bl* [F. *indubitable*—from L. *indubĭtābĭlĭs*, that cannot be doubted—from *in*, not; *dŭbĭtō*, I doubt: It. *indubitabile*]: not to be doubted; unquestionable; evident. INDU'BITABLY, ad. *-blĭ*. INDU'BITABLENESS, n. *-bl-nĕs*.—SYN. of 'indubitable': undoubted; clear; plain; incontrovertible; incontestable; undeniable; irrefragable.

INDUCE, v. *ĭn-dūs'* [L. *indūcĕrĕ*, to lead or bring in—from *in*, into; *dūcō*, I lead]: to move by persuasion or argument; to prevail on; to cause; to influence by motives. INDU'CING, imp. INDUCED', pp. *dūst'*. INDU'CER, n. *-sĕr*, one who. INDU'CIBLE, a. *-sĭ-bl*, capable of being induced. INDUCE'MENT, n. *-dūs'mĕnt*, motive; anything that leads or influences the mind to will or act.—SYN. of 'induce': to actuate; impel; influence; persuade; produce; effect; superinduce; move; instigate; urge; press; incite;—of 'inducement': reason; influence; persuasion; purpose; object.

INDUCIÆ, n. plu. *ĭn-dū'shĭ-ē* [L. *indūcĭæ*, a truce, pause, delay]: in *Scotch law*, days of grace; the days which intervene between the citation of a defender, and the day of appearance in the action.

INDUCT, v. *ĭn-dŭkt'* [L. *inductus*, led or brought in—from *in*, in; *dūcō*, I lead]: to introduce, as to an office, or to an eccles. benefice; to put formally into possession. INDUCT'ING, imp. INDUCT'ED, pp. INDUC'TOR, n. *-tĕr*, one who. INDUC'TILE, a. *-dŭk'tĭl*, not capable of being drawn into threads, as a metal. IN'DUCTIL'ITY, n. *-ĭ-tĭ*. INDUCTION, n. *ĭn-dŭk'shŭn* [F.—L.]: introduction into an office, as of a clergyman into a benefice; the inference of some general truth from special facts; the method of reasoning from particulars to generals (see INDUCTION AND DEDUCTION); the influence by which an electric or galvanic current produces magnetic polarity in certain bodies near or round which it passes (see INDUCTION, ELECTRIC; INDUCTION COIL): in *OE.*, something introductory to a play; a preface. INDUC'TIONAL, a. pertaining to. INDUC'TIVE, a. *-tĭv*, leading to inferences; operating by induction. INDUC'TIVELY, ad. *-lĭ*. INDUCT'EOUS,

a. *-ē-ŭs*, in *elect.*, rendered electropolar by induction, or brought into the opposite electrical state by the influence of inductive bodies. INDUCTIVE SCIENCE (see under SCIENCE). *Note.*—INDUCTION and INDUCTIVE regard generalizations drawn from the consideration of a number of particular facts; while *deduction* and *deductive* are said of such generalizations when applied to particular facts or cases. By *induction* we establish the law that heat expands bodies; by *deduction* we are enabled to explain by this law why the pendulum, and consequently the clock, moves more slowly in summer than in winter.

INDUCTANCE: any coil or loop in which an electrical pressure is induced by the flow of current through it. See ELECTRO-DYNAMICS.

INDUCTION AND DEDUCTION: the two principal methods or phases of inference (q.v.). Induction is the discovery of general laws or principles of connection among facts. Experience comes to us as a confusion of more or less unrelated elements. We instinctively presuppose, however, that the facts are uniformly related, and it is one of the most important functions of the mind to ascertain the real though hidden connections among them. In its simplest stage this process consists in formulating a general rule upon the basis of a limited number of observations, as when we say 'All red-haired persons are quick tempered,' or 'Swampy districts are malarial.' It reaches its best form in 'causal analysis.' Here the connection between the facts is not only observed, but explained by having its details brought to light as instances of previously established inductive conclusions. Thus the study of malaria reveals its relation to swampy land as a series of details, viz., the habits of the mosquito in breeding in wet places, the presence of malaria germs in the blood which the insect draws from its victims, the transmission of these germs to other victims, their location and multiplication in the red blood corpuscles of the latter, etc. The result, which might be elaborated in much more minute detail, is a systematic statement of the law of malarial infection, inductively ascertained.

The importance of the relation of cause and effect, both for our theoretical understanding of the world and for our practical calculations of the future, indicates the corresponding importance of *causal inductions.* Accordingly for science, which is constantly in search of causal relations, the term induction means specifically the discovery of these explanatory principles of connection. Five methods for such investigative effort were enumerated by John Stuart Mill, who formulated their 'canons'. The first and second are as follows: (1) The method of agreement. 'If two or more instances of the phenomenon under investigation have only one circumstance in common, the circumstance in which alone all the instances agree is the cause (or effect) of the given phenomenon.'

E.g., heat is the common antecedent of the melting of ice, metal, grease, etc. (2) The method of difference. 'If an instance in which the phenomenon under investigation occurs, and an instance in which it does not occur, have every circumstance in common save one, that one occurring only in the former, the circumstance in which alone the two instances differ is the effect or the cause or an indispensable part of the cause, of the phenomenon.' E.g., the compass needle is deflected, when in proximity to iron, from its regular north and south direction. The third is the joint method of agreement and difference, a combination and elaboration of the foregoing. The fourth, or method of concomitant variations, states the principle that facts which vary together are connected through causation, as in the case of the moon's movement and the tides. The fifth is the method of residues. It tells us that if a fact is only partially explained, the completion of its explanation is to be sought in the insufficiently examined circumstances which attend the fact. In many of the sciences the application of these methods is facilitated by artificial experiment and special apparatus; they are, however, fundamentally constitutive principles of our thinking, and as such are employed in the commonest observations of daily life.

Induction is often imperfect or incomplete. It depends upon observed resemblances and differences, and where these are not clearly and definitely given, the conclusion is correspondingly uncertain. In some cases the similarity among the facts is coupled with wide dissimilarity in other respects. Here there is often a basis for induction by 'analogy,' as in Newton's famous perception of the relation between the falling apple and the movement of the heavenly bodies. Such analogical inductions, previous to further verification, are merely 'probable.' There are also many classes of facts which permit only of an approximate statement of causal relationship, as in the case of old age and death; or which indicate a group of alternative possibilities, one of which is the cause or effect. In these fields induction takes the form of finding the average which the various instances more or less closely approach. Such imperfect inductions may have great practical utility, e.g., in life insurance, although they afford no completely determinate information about particular cases.

In all induction the direction of the mind is from particular facts to general relations. The converse of this process is deduction. Here a universal proposition of greater or less extent is assumed, and from it something relatively particular is inferred. Thus when we conclude from the appearance of the sky that rain will soon come, we do so upon the supposition that such a sky always forebodes rain. The perfect form of deduction is the Syllogism (q.v.), which is the logical method of proof.

Geometry affords a technical illustration in its proofs of theorems.

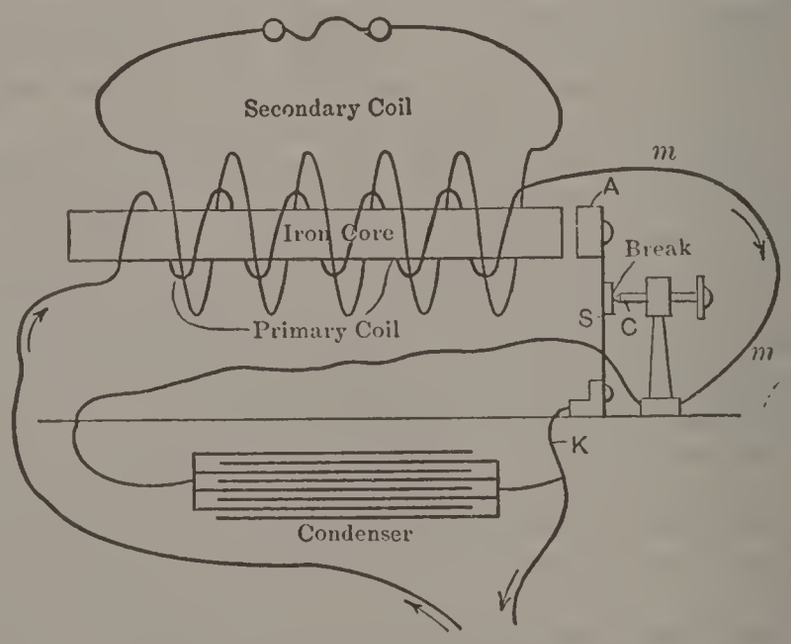
Historically, the theory of deduction was developed before that of induction. Stated with wonderful completeness by Aristotle, it so overshadowed the latter (of which he also gave a rudimentary statement) that for centuries it was regarded as the only correct logical method. All truths were supposed to be deducible from premises divinely implanted in the mind, or authoritatively stated by certain individuals. Accordingly, inductive discoveries were subjected to deductive criticism, and if they failed to appear as conclusions from the accepted premises they were rejected, as in the case of Copernicus' theory of the solar system. The tremendous energy of scientific effort in the 16th and 17th centuries, however, brought induction into the foreground. Francis Bacon's writings effectively magnified its importance, and it has come to be recognized as the indispensable method of scientific progress.

The two processes, induction and deduction, are commonly regarded as entirely distinct. Modern investigations of the nature of thought, however, show that both are involved in any inference, and that the distinction is one of emphasis or prominence rather than absolute in character. Inductive advance constantly makes use, consciously or unconsciously, of deductive steps, and conversely the assumption of premises for deduction always presupposes the 'inductive leap' from the particular facts to the general statement. According as thought is more explicitly a progress from the particular to the general, or vice versa, it is called induction or deduction.

INDUCTION BALANCE: in physics, an apparatus designed for detecting the presence of fragments of metal, or for studying the electrical conductivity of metals. It consists essentially of four coils of fine wire, an electric battery, a circuit breaker, and a telephone. Let the coils be designated, respectively, by the letters A, B, C and D; A being similar to B in all respects, and C being likewise similar to D. Coils A and B are placed in circuit with the battery, and coils C and D are placed in circuit with the telephone. The coils are disposed in pairs, A being placed near C, and B near D. If the current through A and B is rapidly interrupted, an induced current will, in general, flow through C and D, at each make and break; its presence being indicated by the sounds that it produces in the telephone that is in circuit with C and D. It is possible, however, to dispose the coils and their connections so that the current that A induces in C shall be sensibly equal and opposite to that which B induces in D. When the balance is perfect, no sound will be heard in the telephone. If a piece of metal be now brought near the coil A, the intermittent current in A will induce currents in the mass of the piece of metal, and these, in turn, will act upon the coil

C, producing induced currents in this coil which are not compensated by similar currents in D. The loss of balance will be at once indicated by the recurrence of sounds in the telephone; and in this way the metal fragment will betray its presence. The induction balance has been used successfully for locating bullets in the human body. When applied for this purpose to President Garfield, however, it failed to give any useful indications—owing, it is said, to difficulties of manipulation due to the presence of metal in the mattress upon which he lay. The instrument is so sensitive that if it is balanced with a genuine coin near one of the coils, and the genuine coin is then replaced by a counterfeit imitation, the telephone at once betrays the substitution. The intensity of the sounds produced in the telephone depends not only upon the size and position of the disturbing piece of metal, but also upon its specific electrical resistance; and hence the balance may be used to compare the specific resistances of metals. Consult: Hopkins, *Experimental Science;* Thomson, *Recent Researches in Electricity and Magnetism;* Bell, *The Induction Balance,* in the American Journal of Science for 1883.

INDUCTION COIL: an electrical instrument used for the production of high potentials, and depending for its action upon the fact that induced currents are generated in a circuit, when the strength of the magnetic field to which the circuit is exposed is varied. The essential



features of the instrument are represented, diagrammatically, in the accompanying cut. A soft iron core is surrounded by two coils of wire, one outside of the other. The outer coil is the one in which the high tension induced currents are produced; it is called the 'secondary coil,' and is not in direct electrical connection with any other part of the instrument. The inner coil, which is called the primary coil, is wound close to the iron core,

and is connected to a battery, so that when the current from the battery is flowing, the primary coil causes the iron core to become magnetized. As is explained in the article ELECTRICITY, PRINCIPLES OF, no current is generated in the secondary coil, so long as the magnetism of the iron core remains constant; but whenever the magnetism of the core increases or diminishes, a current is produced in the secondary. A device called the 'break' or 'interrupter' is, therefore, provided, so that the magnetism of the iron core may be rapidly established and destroyed.

A common form of interrupter is that shown in the cut, which is similar to the electric bell or buzzer vibrator (see ELECTRICAL COMMUNICATIONS, SYSTEMS OF). With the flat spring S in its normal or vertical position the contact piece on the spring touches the screw C, thus completing the circuit from wire K through S and C to wire *m*. The current passes over this path through the primary coil (indicated by the thick helix wound nearest the iron core) and magnetizes the iron. The magnetic lines which spring into position cut the wires of the secondary winding, thereby producing an electrical pressure in them. At the same time the magnetized core attracts the soft iron piece A, fastened to the spring, and causes it to fly over to the end of the core. This breaks the circuit, the spring S having moved out of contact with the screw C. Consequently current flow is interrupted, the lines of force collapse and disappear, cutting the wires of the secondary and producing an electrical pressure *opposite* in direction to that produced when the lines spring out. Since the pressure depends on the *rate of cutting the magnetic lines*, it is obvious that with a large number of turns in the secondary coil, and a strong field, the pressure will be very great because the stoppage of the magnetizing current when the 'break' takes place is almost instantaneous and the speed of collapse of the lines very great.

When the magnetism is destroyed there is no longer any force to hold the iron piece A against the end of the core and the spring flies back to its vertical position again, closing the circuit. This movement or oscillation of the 'interrupter' may be many hundreds per second.

The Wehnelt electrolytic interrupter is greatly in favor among physicists, however, and is now often used in connection with induction coils, especially when they are to be run with the commercial current used for incandescent lighting, where the potential difference that is used is something over 100 volts. In the induction coil the primary coil on the iron core is made of a few turns of relatively thick copper wire, its purpose being solely to effect the magnetization of the core; but the secondary coil, in which the induced currents are generated, is made of fine wire, and in order to multiply the inductive effect as far as possible, the secondary is made of a great

many turns, often containing several miles of wire. In the celebrated Spottiswoode coil, the secondary contained no less than 280 miles of wire. The primary coil, being wound directly upon a soft iron core, commonly has a very considerable amount of self-induction, so that when the circuit is broken by the interrupter the current does not suddenly cease, but continues to flow across the interval at the break for an appreciable fraction of a second, as is readily seen by the strong sparking that occurs at the moment of interruption. In order to reduce the sparking as far as possible, a condenser of suitable capacity is provided, so that when the break is made in the circuit, the 'after-current' due to the self-induction of the primary can discharge into the condenser, instead of passing across the break in the circuit and causing a spark. The condenser causes the interruption of the current in the primary coil to be much more sudden, and it materially increases the potential that is developed in the secondary coil, since this is proportional to the rate of variation of the magnetism of the core, and is much greater when the magnetism falls off abruptly than when it persists for an appreciable fraction of a second after the break has been made.

The induction coil was brought into something like its present form by Ruhmkorff, and is frequently known, in consequence, by his name. Improvements in the winding of the secondary coil were introduced by Ritchie, of Boston, about 1857. Ritchie's most important improvement consisted in disposing the secondary wire in sections, which were so related to one another that the risk of internal disruptive discharge through the coil itself might be reduced to a minimum. Induction coils are very generally used in studying the discharge of electricity through gases, for exciting X-ray tubes, and for producing high potentials required in wireless telegraphy. Consult: Bonney, *Induction Coils;* Wright, *The Induction Coil in Practical Work;* Hare, *Construction of Large Induction Coils;* Norrie, *Induction Coils.*

INDUC'TION, Electric: the power (and the action) of electric currents to induce currents in neighboring conducting circuits. This was discovered by Faraday, whose researches on the subject, named by him *volta-electric* induction, were published in the Philosophical Transactions (1831-2). Henry (1832) observed that when contact was broken in a long galvanic circuit a bright spark occurred which did not occur when the circuit was short. This was shown by Faraday (1834) to be due to the extra current induced by the various parts of the circuit in each other. Bachhoffner and Sturgeon (1837) showed the superior action, in induction apparatus, of a bundle of iron wires to that of a solid bar of iron. Henry (1841) studied the inductive action of induced currents of different orders. De la Rive designed, 1843, an electro-chemical condenser, consisting of

a primary coil, which, by means of the extra current, could enable a single galvanic cell to decompose water. The same decomposition, however, had been effected by Wright 1840. Ruhmkorff constructed (1850 or 51) the first so-called *induction coil,* the excellence of which was attained chiefly by the proper insulation of the secondary coil. Fizeau (1853) increased immensely the power of the coil, by providing it with a condenser. Of late years, coils of great power have been constructed, rivalling, if not exceeding, the most powerful electric machines in length and power of spark. See ELECTRICITY, PRINCIPLES OF; ELECTRO-DYNAMICS; INDUCTION COIL.

INDUCTION, MATHEMATICAL: a method of reasoning by which it is shown that if a theorem is true in one case, it is true in a next higher case. Then, if it be proved in any way that the theorem holds in one case of the series, it holds in every subsequent case. Thus the Binormial Theorem $(a+b)^n = a^n + na^{n-1} b + \frac{1}{2}n(n-1) a^{n-2} b^2 + \ldots + b^n$ being assumed to hold for the exponent n can be shown to hold for the exponent $n+1$. But it is known to be true for $n=1$; hence it is true for $n=2$, then for $n=3$, and so on indefinitely. Many mathematical theorems are best proved in this way. For another example it may be verified for small values of n that $1^2 + 2^2 + 3^2 + \ldots + n^2 = \frac{1}{6} n(n+1)(2n+1)$. And by adding $(n+1)^2$ to both sides of the equation, it is found to hold for $n+1$. Then it holds for every n.

INDUCTION MOTOR. See ELECTRICAL MACHINES.

INDUCTIVE: having the property of an inductance.

INDUCTOR: any moving mass of iron which varies the reluctance of a magnetic path and causes a variation of shifting of magnetic lines of force. Usually applied to certain parts of Inductor alternators. See ELECTRICAL MACHINES.

INDUE, v. *ĭn-dū'* [L. *indu'ĕrĕ,* to clothe with: Gr. *endŭō,* I put on]: to clothe; to invest; to supply with; in *OE.,* to endow; to furnish. INDU'ING, imp. INDUED', pp. *-dūd':* see ENDUE.

INDULGE, v. *ĭn-dŭlj'* [L. *indulgĕō,* I am courteous, I pamper—from *in,* in or on; *dulcis,* sweet]: to yield to the enjoyment or practice of without constraint or control; to suffer; not to restrain or oppose; to grant as a favor; to humor. INDUL'GING, imp. INDULGED', pp. *-dŭljd'.* INDUL'GENCE, n. *-dŭl'jĕns* [F. *indulgence*—from L. *indulgen'tĭă*]: forbearance of restraint or control; gratification; favor granted; a power claimed by the Roman Cath. Church of granting remission of the penalty due to sin for a certain time, either on earth or in purgatory; or, a remission of temporal punishment due to sin after the guilt has been removed by penance: V. to attach or grant an indulgence to any pious practice. INDUL'GENCED, a. *-jĕnst,* specially authorized. INDUL'-

GENT, a. *-jĕnt* [F.—L.]: compliant; unduly favorable; yielding to the wishes and desires, etc., of those under one's care. INDUL'GENTLY, ad. *-lĭ*. INDUL'GER, n. *-jĕr*, one who.—SYN. of 'indulge': to gratify; favor; humor; cherish; foster; allow; harbor; grant.

INDUL'GENCE, in Roman Catholic Theology; a remission, by church authority, to a repentant sinner, of the *temporal* punishment which remains due after the sin and its eternal punishment have been remitted: A doctrine which has been the subject of so much angry controversy, and which may be regarded as the chief among the proximate causes of the Reformation, deserves very careful consideration. We must confine ourselves, however, to a brief authentic explanation of the doctrine as it is held by Roman Catholics, together with a history of the practice in the various ages of the church.

By the discipline of the first centuries, a severe course of penitential observance was exacted of all who fell into any grievous crime, especially apostasy, murder, and adultery, such sinners being excluded from church communion for various periods in some cases even till the hour of death. These penitential observances, which Protestants regard as purely disciplinary, were designed, according to the Roman Catholic view, as an expiation, on the part of the penitent, for the *temporal* punishment, which, after sin and the *eternal* punishment due to it have been remitted by God, still remains to be undergone; and some of the most acrimonious of the early controversies, the Montanist and the Novatian, arose as to the power of the church to relax these penitential observances, and to admit grievous sinners to communion. These ancient relaxations (of which they regard that referred to in I Cor. v. 5 and in II Cor. ii. 10 as a type) are considered by Roman Catholics as examples of the modern indulgence; and the practice which grew up in the 3d and 4th c., and which even then was carried to great extremes, of granting such relaxations on the recommendation of martyrs or confessors, is held by Roman Catholic theologians to be an illustration of that principle of vicarious atonement, according to which, in the theory of indulgences, the church is supposed to supply, from the inexhaustible treasure of the merits of Christ, and of the 'supererogatory' works of the saints, what may be wanting to the completeness of the atonement of the less perfect but yet truly penitent sinner to whom she grants the indulgence. That this practice of relaxation, whatever may have been its real import, was to be used according to the judgment of the bishop as to the disposition of the penitent, is expressly laid down by the Council of Ancyra 308, and by that of Nice 325. In all cases, however, the person granting the relaxation was to impose certain good works as a partial substitute for the penalty which had been relaxed; and among these works, which had at first been

purely personal, came by degrees to be included money payments for certain religious or charitable objects, as the building of a church, or the foundation of a monastery or hospital. The name indulgence appears to have originated late, the first recorded instance of its use being by Alexander II., 11th c.; but the institution itself is found in full development during the wars of the Crusades, the serving, or the contributing to service in which, 'provided it were for devotion alone, and not from motives of greed or of glory,' was accepted in the Council of Clermont 'as an equivalent substitute for all penance.' Such an indulgence was called 'plenary'; where a portion only of the penitential works was relaxed, it was called 'partial'; and, to put a bar to their excessive multiplication and to other abuses, Innocent III. declared the power of granting 'plenary indulgences' to be reserved to the pope alone, bishops being authorized to grant only the 'partial' or limited indulgences described above. The fourth Lateran council condemns the 'indiscreet and superfluous' granting of indulgences; and among the abuses which grew up in the church during the western schism, one of the most remarkable was the lavish dispensation of indulgences, in the granting of which the contending popes rivalled each other in prodigality. The last extreme, however, was not reached until the beginning of the 16th c., when, with a view to raising the funds necessary for the erection of the great church of St. Peter's at Rome, the pope, Leo X., published a plenary indulgence, the principal condition for the gaining of which was a contribution to this work. Roman Catholic historians contend that in itself such a condition was perfectly justifiable, and that if duly explained to the people, it might be lawfully and even meritoriously complied with; but they admit that many of the preachers of the indulgence, in extolling its natural effects, went to indefensible extremes, and that, even making the fullest allowance for exaggeration, it cannot be denied that grievous abuses both of doctrine and of practice were committed in Germany and in Switzerland. Hence the decree of the Council of Trent, while it affirms that the use of indulgences, as being 'most salutary for the Christian people, and approved by the authority of councils, is to be retained in the church,' yet orders that, 'in granting them, moderation be observed, lest, by excessive facility, discipline may be enervated.' Upon the special instructions of this council, all the modern legislation on the subject of indulgences has been founded; but as the decree of the council does not explicitly declare what is the precise effect of an indulgence, it is further explained by Pope Pius VI., in his celebrated bull, *Auctorem Fidei*, that an indulgence received with due dispositions, remits not alone the canonical penance attached to certain crimes in this life, but also the tem-

poral punishment which would await the penitent after death to be endured by him in purgatory.

From the above explanation, it will be gathered that Roman Catholics do not understand by an indulgence a remission of sin, much less a permission to commit sin, or a promise of forgiveness of future sin. They contend, moreover, that since the benefit of an indulgence can be received only by a sinner who has repented of sin, and resolved to embrace a new life, the imputation of introducing laxity of principle and easy self-indulgence is entirely unwarranted. And though, for the most part, the good works which are required as the condition of obtaining indulgences may appear easy and even trivial, yet the one indispensable preliminary—sorrow for sin and sincere purpose of amendment—in itself involves the very highest effort of Christian virtue.

On the subject of indulgences, Protestants are accustomed to quote the language used by popes in granting them, in opposition to the views put forth by Roman Catholics in defending them. And nothing is more common than for popes in their bulls of jubilee, to grant *the most plenary and complete indulgence, pardon, and remission of all sins,* on certain conditions specified. And though this grant is made only to 'the faithful who are truly penitent and have confessed,' yet being limited to a certain period, as the year of jubilee, and to certain conditions, as saying certain prayers, visiting certain churches, wearing or kissing a scapular, or the like, it is argued that these cannot but acquire, in the estimation of the people, an importance which is very unfavorable to penitence, virtue, faith, and piety. It is likewise urged that the whole doctrine of indulgences is founded not only on an unwarranted assumption of power given to the church, but also on a doctrine of human works and merits inconsistent with what is taught in Scripture as to the office of Christ as the complete, sufficient, and only Saviour.

INDULT, n. *ĭn-dŭlt',* or INDULTO, n. *ĭn-dŭl'tō* [L. *indultus,* indulged]: right to present to certain benefices and dignities, granted by the pope; in *France,* a right of demanding at the filling up of a vacant bishopric or abbey the presentation to the first benefice falling vacant in that bishopric or abbey; in *Spain,* a duty or tax paid.

INDUMENTUM, n. *ĭn'dū-mĕn'tŭm* [L. a garment—from *indŭō,* I put on]: the plumage of birds; in *bot.,* a hairy covering.

INDUPLICATE, a. *ĭn-dū'plĭ-kāt* [*in,* in, and *duplicate:* L. *dūplex,* double]: in *bot.,* applied to the arrangement of a flower-bud in which the edges of the sepals or petals are slightly turned inward. INDU'PLICATIVE, a. *-kā-tĭv,* in *bot.,* applied to a modification of valvate prefloration in which the edges of the petals or sepals are bent in or rolled round.

INDURATE, v. *ĭn'dū-rāt* [L. *indūrātus*, hardened—from *in*, into; *dūrō*, I harden: It. *indurato*]: to make or grow hard; to harden; to make unfeeling. IN'DURATING, imp. IN'DURATED, pp.: ADJ. hardened; made obdurate; in *geol.*, applied to rocks that have been hardened by the action of heat. IN'DURA'TION, n. *-rā'shŭn*, the act of hardening, or process of growing hard.

INDUS. See under INDRA.

INDUS, n. *ĭn'dŭs* [Skr. *Sindhu*, irrigator; probably from a root signifying 'to flow']: great river that bounds Hindustan on the west. It rises in unknown regions in Tibet, near the sources of the kindred Sutlej, lat. 31° 20′ n., and long. 81° 30′ e. The precise spot is said to be 18,000 ft. above sea-level, and on the n. side of the Kailas, a Himalayan peak which overtops it by at least 4,000 ft. Its general course, till it forces its way between the Himalaya Proper and the Hindu Kush, is toward the n.w., being nearly at right angles to its general direction through the plains. On reaching Sussi (near the borders of Budakshan), its most northern point, it turns s., hides among the hills, and reappears at Takot in Kohistan, n. of the Punjab. After a course of 870 m., having still 940 m. before it, it becomes navigable at a point which, for other reasons also, is worthy of notice. Here it receives the Cabul, its principal affluent on the right; and here is Atak (Attock), anciently Taxila, scene of Alexander the Great's passage. About half way from Atak to its mouth, it receives, on the left, the accumulated waters of the Punjab through the single channel of the Punjnud. Each of the 'five water-courses,' as well as the Cabul, is navigable for inland craft to the mountains. Below its confluence with the Punjnud, the Indus, instead of increasing in volume, becomes gradually less. Its basin is here narrow, so that the affluents are insignificant, while the arid sandy soil causes the river to suffer from absorption and evaporation. This operates still more powerfully from the fact that the river here divides into numerous channels, many of which never return at all to the main stream, while others return much shrunken in volume This wasting of the waters is, however, not very apparent to the eye, owing to the gradual slackening of the current and the ascent of the tides. At Migani, eight m. n. of Hyderabad, commences the Delta Proper, which measures 75 m. upward, by 130 along the coast of the Arabian Sea. The area of the drainage—its extreme dimensions being respectively 900 m. and 750—has been estimated at 373,000 sq. m., more than three times the extent of Great Britain and Ireland.

The value of the Indus as a route of traffic is less than that of most other streams of equal magnitude. In the winter, one only of its numerous outlets is at all available for communication with the sea; and even after the melting of the spring snows, there is no passage

anywhere for an ordinary sea-going vessel of more than 50 tons. Still, in another respect the river is favorable for navigation, as the fall from Atak to the sea is only 2,000 ft. in 940 miles.

The Indus abounds with fish of excellent quality, and is infested by crocodiles. The alluvium brought down by the stream has been calculated to be sufficient for an annual formation 42 m. long, 27 m. broad, and 40 ft. deep. Near Rori, a short distance below the first point of divergence, both the main stream and one of its offsets pass through a ridge of limestone, which must at one time have turned the descending floods laterally into what is now a desert, but bearing the plainest traces of former cultivation.

INDUSIA, n. *ĭn-dū'zĭ-ă*, INDU'SIÆ, n. plu. *-zĭ-ē* [L. *indūsĭŭm*, a shirt, a woman's under garment—from *indŭō*, I put on]: the cases or coverings of certain insects. INDU'SIAL, a. *-zĭ-ăl*, composed of or pertaining to petrified indusiæ. INDUSIAL LIMESTONE, remarkable variety of fresh-water limestone found in Anvergne, abounding in the indusiæ or cases of caddis-worms, great heaps of which have been encrusted with carbonate of lime, and formed into a hard travertine. Several beds occur, some as much as six ft. thick, each cubic inch of which contains as many as ten or twelve cases (see CADDICE). The Auvergne cases are formed of the shells of a minute Paludina, so small that 100 shells may be counted in a single indusium. INDUSIUM, n. *ĭn-dū'zĭ-ŭm*, a covering or case; in *bot.*, the epidermal covering of the fructification in some ferns; a collection of hairs so united as to form a sort of cup, and which incloses the stigma of a flower.

INDUSTRIAL, a. *ĭn-dŭs'trĭ-ăl* [F. *industrie*, industry —from L. *indus'trĭă*, carefulness, industry: It. *industria*]: relating to industry, or the products of the arts and manufactures. INDUS'TRIALISM, n. *-ĭzm*, state of society in which all the members coöperate for the common good; opposed to militancy. INDUS'TRIALLY, ad. *-lĭ*. INDUS'TRIOUS, a. *-trĭ-ŭs*, diligent in business or study; assiduous; not remiss. INDUS'TRIOUSLY, ad. *-lĭ*. INDUSTRY, n. *ĭn'dŭs-trĭ*, habitual diligence in any employment or pursuit. INDUSTRIAL ACCESSION, phrase borrowed by the Scotch from the Roman law to denote the increased value given to a thing by labor and skill exercised upon it: this phrase includes the case of a person building by mistake on another's land, in which case, in England, though the building was done *bonâ fide*, it belongs absolutely to the owner of the land, who is not bound even to pay for the materials, which he can keep, or their value; but in Scotland, the owner of the land, though entitled to the materials, would be liable to pay their value. INDUSTRIAL EXHIBITION, see EXHIBITION INDUSTRIAL. INDUSTRIAL FRUITS, in *Scotch law*, produce of

land which the life-renter is entitled to (see EMBLEMENTS). INDUSTRIAL SCHOOL, a school in which some of the mechanical arts and useful occupations are taught.—SYN. of 'industry': diligence; assiduousness; assiduity; laboriousness.

INDUSTRIAL ALCOHOL. See ALCOHOL, DENATURED.

INDUSTRIAL COMMISSION: a non-partisan body authorized by congress 1898, June 18, to investigate the subjects of 'immigration, labor, agriculture, manufactures, and business' in the United States, with the utmost fairness to both capital and labor, and report to congress with suggested legislation, as a basis not only for national law and administration, but for uniformity of state laws. The members were five senators appointed by its president, five representatives appointed by the speaker, and nine private gentlemen appointed by the president and senate, fairly representing different industries and branches of national life. Originally appointed for two years, the term was extended to 1901, Dec. 15, and then to 1902, Feb. 15, the last report being dated the 10th. The actual work was done by the private members, who employed 27 experts on the various lines, and examined nearly 700 witnesses; making a report in 19 volumes, of the highest value from the unmatched thoroughness and authoritativeness of the view on every side of our industrial system brought out.

INDUS'TRIAL SCHOOLS: English term variously applied; sometimes synonymous with ragged schools, in which mechanical arts are taught, sometimes designating ordinary elementary schools, in which agriculture, domestic science, or some other industrial art is taught during a portion of the school day. See MANUAL TRAINING.

INDUS'TRIAL SOCI'ETIES: societies which carry on some trade, the profits of which are applied to an object of mutual benefit, resembling the object of Friendly Societies (q.v.). In Great Britain, the 'Industrial and Provident Societies Act, 1876,' regulates these societies on improved principles, the first statute having been passed 1852. Any number of persons not less than seven may establish such a society, for the purpose of carrying on any labor, trade, or handicraft, whether wholesale or retail, or the buying and selling of land, or the business of banking under certain restrictions, and taking deposits only under 5*s.* in one payment, and under £20 from one person. The rules of the society must define the object, name, and place of office of the society, and it must in all cases be registered as one of limited liability. The rules and statute define terms of admission of members, mode of holding meetings, voting, transferability of shares, audit of accounts, investment of capital, mode of withdrawing or resigning from society, claims

of executors, application of profits, appointment and remuneration of managers and officers, and make provision for the custody, use, and device, of the seal of the society. No member's interest is to exceed £200, but one society may invest its funds with another or others to any amount. These societies are placed on the same footing as Friendly Societies (q.v.) in respect of the exemption from assessment under income-tax, etc. See CO-OPERATION.

INDUSTRIAL UNIONISM: the term used to express a modern form of labor organization whose jurisdiction is not confined to any particular trade or craft, but is co-extensive with the industrial development and embraces the entire working class. Industrial Unionism is the outgrowth of trade unionism and expresses the highest form of industrial organization the working class has yet attained. As its name implies this form of unionism contemplates the organization of industries in their entirety, uniting all employes within the same economic body, subdivided into a number of departments equal to and corresponding with the several trades or general occupations in which they are engaged.

In organizing the workers along the lines of their general industrial interests rather than their particular craft interests, it is claimed that the friction due to overlapping craft jurisdictions is obviated and that a higher degree of solidarity and efficiency is thus secured in the interest of all.

The industrial union in its present form came but recently into existence, the trade union having preceded it, the latter dating back to near the beginning of industrial life in Great Britain, about the middle of the 18 c.

The earlier unions were confined principally to the skilled trades, and hence were called trade unions. These unions were built up on the basis of the skilled use of the tools used in the several trades during the period of handicraft in industry, and later on were loosely joined together in a federation of trades without, however, abridging their autonomy or invading their separate jurisdictions.

Organized upon this basis each craft was left free to negotiate its own wage-scale and enter into agreement with the employer upon terms most advantageous to itself regardless of other crafts that might be employed in the same industry. The results that followed in the way of disastrous strikes resorted to by one or more crafts because of having failed to obtain a satisfactory agreement, while others employed in the same industry, perhaps in the identical factory, remained at their tasks, in co-operation with the non-union element which had displaced their own fellow-workers, paved the way for industrial organization.

The trade union rose with the modern trade and flourished with it, the foundation of both being the skilled use of certain tools in the making of certain commodities for market use. This stage of the industrial development prevailed for many years but has now been largely superseded and is rapidly declining before the march of

industrial evolution, made manifest in the concentration of capital, the displacement of the small shop by the great factory, the handicraft tools by steam-driven machinery, the segregated trade by associated industry and competitive effort by co-operative labor. Along the same line the trade union of the past is now expressing itself more and more in industrial unionism.

Industrial unionism, having evolved from the lower primal forms of trade unionism through the successive stages of the industrial development, and adapting itself to present industrial conditions and their tendencies, has encountered serious opposition on the part of trade unionists as well as the employing class, the former tenaciously adhering to the craft form of organization and resisting all attempts to materially change it, and the latter opposing it on account of its aggressive and revolutionary character; but notwithstanding this the new unionism has made rapid advance during the past two or three years and its principles have now come to be generally recognized by the progressive elements of the labor movement.

Greatly as the industrial union differs from the trade union structurally, the difference in their tendencies and ultimate objects is still more radical and far reaching. Whereas, the trade union occupied itself mainly with establishing and maintaining satisfactory wage scales, hours of labor and working class conditions, industrial unionism, based upon the mutual economic interests of all workers and the solidarity arising therefrom, aims not only at the amelioration of the industrial conditions of the workers, but at the ultimate abolition of the existing productive system and the total extinction of wage servitude.

It is in this fundamental principle that industrial unionism is most radical and revolutionary in contrast with the earlier trade union forms of industrial organization.

The concentration of capital and the highly complex productive mode of the present day, grouping in vast industrial establishments thousands of workers engaged in scores of different trades, and forcing them into closer and closer co-operation, based upon the minutest division of labor, have tended to obscure, or perhaps totally obliterate the lines that once so sharply defined the skilled trades, and in this interweaving of the trades the jurisdictions of the several unions based upon them have overlapped each other and this has been the prolific source of the increasing friction between many of the larger unions which have approximately reached their maximum of growth and are jealous of maintaining the prestige of an expanding membership regardless of the effect upon a rival union which may lay claim to jurisdiction over the same craft, or division thereof. Following the lines of least resistance the tendency of these unions, so far as external forms are concerned, is toward industrial unionism, and this is undoubtedly the form that will ultimately supersede the trade union of the present and past.

Not only in the matter of organic form and fundamental aim does industrial unionism differ from trade unionism, but also in the matter of tactics and methods. Quite as revolutionary as the ultimate end of industrial unionism are the tactics its adherents have adopted for its realization.

The trade unions of the present and past have, with rare exceptions, eschewed political action in any independent capacity as an organized body; have accepted, in the aggregate, the prevailing industrial system as a finality, subject only to such modifications as might be effected through the power of organized effort in the amelioration of conditions and have uniformly affirmed, in express terms or by clear implication, an identity of economic interests between the employing and employed classes.

In contradistinction to this conciliatory and non-political attitude of the trade unions toward the existing wage-system and the capitalist class, it is the declared principle of industrial unionism that the wage-workers have no interests in common with capitalists; that in fact, their material interests are in conflict, and it is its declared purpose to abolish the wage-system and supplant it by a system of industrial co-operation in which the workers themselves shall have full control for their own benefit, and to this end they recognize the necessity of organizing the political as well as the economic power of the working class and of the harmonious exercise of both by such means as will make industrial unionism the medium of attaining industrial democracy. See TRADE UNION: LABOR MOVEMENT.

INDWELLER, n. *ĭn'dwĕl-lĕr* [*in*, in, and *dweller*]: an inhabitant. IN'DWELLING, a. remaining in the heart: N. residence within.

INEBRIATE, v. *ĭn-ē'brĭ-āt* [L. *inēbrĭātus*, made drunk —from *in*, in; *ēbrĭŭs*, drunk]: to make drunk; to disorder the senses; to intoxicate: N. a drunkard. INE'BRIATING, imp. INE'BRIATED, pp. INE'BRIA'TION, n. *-ā'shŭn*, drunkenness. INEBRIETY, n. *ĭn'ē-brī'ĭ-tĭ*, intoxication; drunkenness. INEBRIATES, ASYLUM FOR: see DIPSOMANIA.

INEDITED, a. *ĭn-ĕd'ĭ-tĕd* [F. *inédit*, inedited—from L. *inēdĭtus: in*, not, and Eng. *edited*]: not edited; unpublished.

INEFFABLE, a. *ĭn-ĕf'fā-bl* [F. *ineffable*—from L. *ineffābĭlĭs*, unutterable—from *in*, not; *effor*, I speak out]: unutterable; incapable of being expressed in words—used only in a good sense. INEF'FABLY, ad. *-blĭ*, in a manner not to be expressed.—SYN. of 'ineffable': unspeakable; inexpressible.

INEFFACEABLE, a. *ĭn'ĕf-fās'ā-bl* [F. *ineffacable: in*, not, and Eng. *effaceable*]: that cannot be destroyed or made invisible. IN'EFFACE'ABLY, ad. *-blĭ*.

INEFFECTIVE, a. *ĭn'ĕf-fĕk'tiv* [*in*, not, and *effective*]: failing to produce any effect, or the effect intended; useless. IN'EFFEC'TIVELY, ad. *-lĭ*. IN'EFFEC'TIVENESS, n.—SYN. of

'ineffective': weak; inefficient; inefficacious; vain; fruitless; abortive.

INEFFECTUAL, a. *ĭn'ĕf-fĕk'tū-ăl* [*in*, not, and *effectual*]: not producing its proper effect; weak; resulting in failure. IN'EFFEC'TUALLY, ad. *-lĭ*, in vain. IN'EFFEC'TUALNESS, n. *-ăl-nĕs*, want of power to produce the effect desired; inefficacy.

INEF'FICACY, n. *ĭn-ĕf'fĭ-kă-sĭ*, want of sufficient power to produce the effect desired, or the effect expected; failure.

INEFFICIENT, a. *ĭn'ĕf-fĭsh'ĕnt* [*in*, not, and *efficient*]: not possessing the power or qualities desired; not efficacious; not active. IN'EFFI'CIENTLY, ad. *-lĭ*. IN'EFFICIENCY, n. *-ĕn-sĭ*, want of power or qualities to produce desired effects; inactivity.

INELASTIC, a. *ĭn'ē-lăs'tĭk* [*in*, not, and *elastic*]: not elastic. IN'ELASTIC'ITY, n. *-tĭs'ĭ-tĭ*, the want of elastic power.

INELEGANT, a. *ĭn-ĕl'ē-gănt* [L. *inel'ĕgans*, or *inclĕgan'tem*, not choice or elegant; *in*, not, and Eng. *elegant*]: wanting beauty or polish, as in language or manners; wanting symmetry or ornament. INEL'EGANCE, n. *-găns* [F.—L.], or INEL'EGANCY, n. *-găn-sĭ*, want of beauty or polish, as in language or manners. INEL'EGANTLY, ad. *-lĭ*, not becomingly; without ornament or polish; coarsely.

INELIGIBLE, a. *ĭn-ĕl'ĭ'jĭ-bl* [*in*, not, and *eligible*: F. *inéligible*]: incapable of being elected to an office from absence of necessary qualifications; not to be chosen. INEL'IGIBLY, ad. *-blĭ*. INEL'IGIBIL'ITY, n. *-bĭl'ĭ-tĭ*, incapacity of being elected to an office; state or quality of not being worthy to be chosen.

INEMBRYONATE, a. *ĭn-ĕm'brĭ-ō-nāt* [*in*, not, and *embryo*]: in *bot.*, having neither embryo nor germ.

INENCHYMA, n. *ĭn-ĕng'kĭ-mă* [Gr. *inĕs*, fibres; *engchuma*, what is poured in, juice, tissue]: in *bot.*, cells that have a spiral elastic fibre coiled up in the inside, the cells generally consisting of membrane and fibre combined.

INEPT, a. *ĭn-ĕpt'* [F. *inepte*, foolish—from L. *ineptus*, improper—from *in*, not; *aptus*, fit, apt]: unfit; unsuitable; improper; foolish. INEPT'LY, ad. *-lĭ*. INEP'TITUDE, n. *tĭ-tūd*, unfitness.

INEQUALITY, n. *ĭn'ē-kwŏl'ĭ-tĭ* [F. *inequalité*: *in*, not, and Eng. *equality*]: state of not being equal; unevenness; a part unlike or different from the rest; difference of rank, station, or condition; inadequacy; disparity. In *Algebra*, the relation existing between two quantities when they are unequal, one being greater than the other. The relationship is expressed by the sign $>$ or $<$ placed between the two quantities or between their symbols. The

larger quantity or its symbol is placed upon the open side.

INEQUITABLE, a. *ĭn-ĕk'wĭ-tă-bl* [*in*, not, and *equitable*]: not equitable; not just.

INERADICABLE, a. *ĭn'ē-răd'ĭ-kă-bl* [*in*, not, and *eradicable*]: that cannot be rooted up or destroyed.

INERMIS, a. *ĭn-ėr'mĭs* [L. *inermis*, unarmed]: in *bot.*, unarmed; without prickles or thorns.

INERT, a. *ĭn-ėrt'* [F. *inerte*—from L. *inertem*, without skill, slothful; *inertĭă*, inactivity, laziness: It. *inerte*, inert]: without the power of moving itself, or of active resistance to motion impressed; slow to act; disinclined to act; sluggish. INERT'LY, ad. *-lĭ*, sluggishly; dully. INERT'NESS, n. want of activity; sluggishness. INER'TIA, n. *-ėr'shĭ-ă* [L.]: in *med.*, the sluggish action of some organ or part; that inherent quality of passiveness, or of indifference to a state of rest or of motion, in bodies which preserves them in perpetual rest when undisturbed, or in perpetual motion unless stopped by some resisting force.—The part of this principle involving continuance in rest if undisturbed was known to the ancients, and by them attributed to a certain repugnance to motion, which was a characteristic of all matter; but it was shown by Galileo that the latter part was equally true and general. This property of matter has been called by Kepler *vis inertiæ*.—SYN. of 'inert': dull; passive; inactive; lazy; slothful; indisposed; powerless.

INESCUTCH'EON, in Heraldry: single shield borne as a charge. When there are two or more, they are called escutcheons; for an inescutcheon, it is said, must always occupy the fess point of the shield. An inescutcheon is distinguished from an escutcheon of pretense, which is not a charge, but a separate coat.

IN ESSE, *ĭn ĕs'sĕ* [L. *in*, in; *esse*, to be]: in being; actually existing. IN POSSE, *ĭn pŏs'sĕ* [L. *in*, not; *possĕ*, to be able]: denoting that a thing is not, but may be; probable, though not yet having any real existence.

INESTIMABLE, a. *ĭn-ĕs'tĭ-mă-bl* [F. *inestimable*—from L. *inestĭmābĭlĭs: in*, not, and Eng. *estimable*]: not able to be estimated or computed; being beyond all price; invaluable; incalculable. INES'TIMABLY, ad. *-blĭ*.

INEVITABLE, a. *ĭn-ĕv'ĭ-tă-bl* [F. *inévitable*—from L. *inevitābĭlĭs*, unavoidable—from *evītārĕ*, to shun, to avoid—from *e*, out of; *vītārĕ*, to shun]: that cannot be avoided or escaped from. INEV'ITABLY, ad. *-blĭ*. INEV'ITABLENESS, n. *-bl-nĕs*, or INEV'ITABIL'ITY, n. *-bĭl'ĭ-tĭ*, certainty to happen; impossibility to be avoided.

INEXACT, a. *ĭn'ĕgz-ăkt'* [F. *inexact: in*, not, and Eng. *exact*]: not quite correct or true. IN'EXACT'NESS, n. incorrectness.

INEXCUSABLE, a. *ĭn'ĕks-kū'ză-bl* [F. *inexcusable*—from mid. L. *inexcūsābĭlĭs: in*, not, and Eng. *excusable*]:

not to be excused or justified. IN'EXCU'SABLY, ad. *-blĭ.* IN'EXCU'SABLENESS, n. *-bl-nĕs.*

IN'EXHAUST'IBLE, a. *ĭn'ĕgz-hawst-ĭ-bl,* unfailing. IN'EXHAUST'IBLY, ad. *-blĭ.* IN'EXHAUST'IBLENESS, n. *bl-nĕs,* or IN'EXHAUSTIBIL'ITY, n. *-bĭl'ĭ-tĭ,* state of being inexhaustible. IN'EXHAUS'TIVE, a. *-haws'tĭv,* not to be exhausted or spent.

INEXORABLE, a. *ĭn-ĕks'ŏ-ră-bl* [F. *inexorable*—from L. *inexorābĭlĭs,* unyielding—from *in,* not; *ex,* out of; *ōro,* I plead]: that cannot be moved by entreaty or prayer; inflexible; unyielding. INEX'ORABLY, ad. *-blĭ.* INEX'ORABLENESS, n. *-bl-nĕs,* or INEX'ORABIL'ITY, n. *-bĭl'ĭ-tĭ,* the quality of being inflexible.—SYN. of 'inexorable': implacable; unrelenting; relentless; determined; unchangeable.

INEXPEDIENT, a. *ĭn'ĕks-pē'dĭ-ĕnt* [*in,* not, and *expedient*]: not tending to promote a purpose; unfit; unsuitable to time and place. IN'EXPE'DIENCE, n. *-dĭ-ĕns,* or IN'EXPE'DIENCY, n. *-ĕn-sĭ,* want of fitness; impropriety; unsuitableness to time or place. IN'EXPE'DIENTLY, ad. *-lĭ.*

INEXPENSIVE, a. *ĭn'ĕks-pĕn'sĭv* [*in,* not, and *expensive*]: not costly.

INEXPERIENCE, a. *ĭn'ĕks-pē'rĭ-ĕns* [F. *inexpérience: in,* not, and Eng. *experience*]: want of knowledge derived from observation and trial. IN'EXPE'RIENCED, a. *-ĕnst.*

INEXPERT, a. *ĭn'ĕks-pĕrt'* [*in,* not, and *expert*]: not skilled; wanting in that knowledge or dexterity which is derived from practice. IN'EXPERT'NESS, n. want of expertness.

INEXPIABLE, a. *ĭn-ĕks'pĭ-ă-bl* [F. *inexpiable*—from L. *inexpĭābĭlĭs,* that cannot be atoned for—from *in,* not; *expĭō,* I make atonement for]: admitting of no atonement or satisfaction; that cannot be appeased. INEX'PIABLY, ad. *-blĭ.*

INEXPLICABLE, a. *ĭn-ĕks'plĭ-kă-bl* [F. *inexplicable*—from L. *inexplĭcābĭlĭs,* that cannot be unfolded—from *in,* not; *explĭcō,* I unfold]: incapable of being explained or interpreted; that cannot be rendered intelligible. INEX'PLICABLY, ad. *-blĭ.* INEX'PLICABLENESS, n. *-bl-nĕs,* or INEX'PLICABIL'ITY, n. *-bĭl'ĭ-tĭ,* state of being inexplicable.

INEXPLICIT, a. *ĭn'ĕks-plĭs'ĭt* [L. *inexplĭcĭtus,* unexplained, obscure; *in,* not, and Eng. *explicit*]: not clear in statement.

INEXPRESSIBLE, a. *ĭn'ĕks-prĕs'sĭ-bl* [*in,* not, and *expressible*]: not to be expressed in words; unspeakable; indescribable. IN'EXPRES'SIBLY, ad. *-blĭ,* in a manner or degree not to be told in words.—SYN. of 'inexpressible': ineffable; unutterable; untold.

INEXPRESSIVE, a. *ĭn'ĕks-prĕs'sĭv* [*in,* not, and *expressive*]: not tending to represent or show; not emphatic. IN'EXPRES'SIVENESS, n. *-sĭv-nĕs.*

IN EXTENSO, *ĭn ĕk-stĕn'sō* [L. *in*, into; *extensus*, spread out, extended]: in the extended form; at full length; without abridgment.

INEXTINGUISHABLE, a. *ĭn'ĕks-tĭng'gwĭsh-ă-bl* [F. *incxtinguible*—from mid. L. *inextin'guĭbĭlĭs: in*, not, and Eng. *extinguishable*]: that cannot be quenched or destroyed; that cannot be put an end to.

IN EXTREMIS, phrase, *ĭn ĕks-trēm'ĭs* [L.]: in the last state or stage, whether of life, safety, or resources.

INEXTRICABLE, a. *ĭn-ĕks'trĭ-kă-bl* [F. *inextricable*—from L. *incxtricābĭlĭs*, that cannot be disentangled—from *in*, not; *extrīcō*, I disentangle]: that cannot be freed or disentangled. INEX'TRICABLY, ad. *-blĭ*. INEX'TRICABLENESS, n. *-bl-nĕs*.

IN'EZ DE CAS'TRO. See CASTRO, INEZ DE.

INFALLIBILITY, in controversial theology: the immunity from error—and in the strict and full sense of the term, entire exemption from liability to err (inability to err)—in all that regards faith and morals, which is claimed by the Roman Catholic Church, and, at least as regards the past, by the Greek Church as represented in the decrees of the councils which that church accepts as ecumenical. The claim of the Greek Church, however, which does not go beyond that of *incrrancy*, or actual exemption from error till the present time, differs widely from that of infallibility put forward by the Roman Church, which involves not alone an actual historical immunity from error, but also such a positive and abiding presence of the Spirit of God as will at all times both protect against the possibility of error, and guide and direct in the faithful teaching of all necessary truth. The infallibility claimed by the Roman Church is thus of two kinds, *passive* and *active*—the first (Matt. xvi. 18), in virtue of which the church never can *receive* or *embrace* any erroneous doctrine, no matter by whom proposed; the second, in virtue of which she is charged with the function (Matt. xxviii. 19; xvi. 15; Ephes. iv. 11-16) of permanently *teaching* to the world the essential truths of God, of actively resisting every access of error, and of authoritatively deciding every controversy by which the oneness of belief among the faithful may be endangered. Roman Catholics regard this gift as a natural and necessary accompaniment of the authority in matters of faith with which they believe the church to be invested, and which, if not guided in its exercise by such infallible assistance, would be but a false light, and an attractive but dangerous instrument of delusion.

Regarding this claim, two important and practical questions arise, both of which have occasioned much controversy among Roman Catholics themselves, viz., as to the *subject*, that is, the seat or the organ of this infallibility; and as to the *object*, that is, the matters to which it extends.

As to the first, all Roman Catholics have been agreed that the body of bishops, morally speaking, throughout the church, acting in common with the pope, constitute the most perfect organ of the infallibility of the church; hence, that when they unite in any way, whether as assembled in a general council or separated in place, their judgment is infallible. Thus, if a doctrinal decree be addressed officially by the pope to the whole church, and be either expressly confirmed or tacitly accepted by the bishops, this decree was held infallible. In like manner, if a doctrinal decree, emanating even from a local council, as that of a national, or even of a provincial church, should be universally accepted by the pope and the bishops, that decree also was held to be infallible. In a word, wherever there is found the *united* judgment of the pope and the bishops, all agreed in accepting it as the infallible judgment of the church. But should the pope alone judge without the bishops, then arose the well-known dispute of the Gallican and ultramontane divines; the latter affirming, the former denying, the infallibility of the papal judgment; but all agreeing that it was not binding *as an article of Catholic faith,* so long as it had not received the assent of the body of the bishops. By the decree of the Vatican Council (1870), this controversy has been decided; and it is now agreed that the doctrinal decrees of the pope teaching *ex cathedrâ* are to be accepted as possessing the same infallibility which attaches to the teaching of the church (see COUNCIL, OR SYNOD).

On the matters or subjects to which the gift of infallibility extends, Roman Catholics are agreed in one principle, that it embraces all those subjects, and those only necessary for maintenance of divine truth in the church. Hence, presupposing divine revelation, either written or oral, it embraces all questions of faith and morality, all subjects of general discipline, so far at least as to preclude the introduction, by authority of the church, of any discipline which should be injurious to faith or to morality. On the other hand it does not embrace questions of science, or matters of fact, or abstract opinions unconnected with faith and morals. On this point all Roman Catholics have been agreed. But a very celebrated dispute arose in the 17th c., on occasion of the *Augustinus* of Jansenius, as to the infallibility of the church in judging of books, out of which originated the well-known Jansenist distinction of *law* and of *fact* (see JANSENISM). On this it is enough to say, that all Roman Catholics are now agreed in recognizing as a necessary condition to the effective infallibility, that it should extend to the judgments on books so far as to decide whether the doctrine contained therein may or may not be opposed to sound faith or morality.

The arguments in favor of the infallibility of the church, which Roman Catholics derive from texts of

Scripture, are set aside by Protestants on the ground that these teach only the permanence of the church and the continuance of God's grace toward it (as Matt. xvi. 18; Matt. xxviii. 19, 20; etc.), and have no relation whatever to the special subject of infallibility. Moreover, it is said that whatever may be the infallibility conferred on '*the Church*' in Holy Scripture, it cannot be claimed by a hierarchy or priesthood, but must belong to the congregation (ekklesia) or assembly of disciples, whether locally or generally gathered; and that as an ecumenical assembly of all disciples is in the nature of the case impossible, the infallibility promised must be for guidance of the local company 'gathered together in Christ's name,' in their dealing with difficult duties as such duties may arise. (Compare Matt. xviii, 17, with 19, 20; and with Mark x. 42, 43; also see ECCLESIA. It is common also for Protestants to urge that on the supposition of infallibility and of the need of an infallible interpreter of Scripture, as commonly declared by Roman Catholics, there can be no value in any argument from Scripture; and that the Roman Catholic theologian, in attempting to prove at once the infallibility of the church by Scripture, and the authority of Scripture by the infallibility of the church, is involved in the sophism of reasoning in a circle. On the Protestant side it is sometimes added, that if God's word needs an interpreter to make it a safe rule of faith, man's word may well be supposed equally difficult to comprehend. And the notion of infallibility, with the whole system of which it forms an essential part, is protested against as contrary to the rational nature of man, and to that personal relation and responsibility to God on the part of each soul which are at the foundation of all true religion. Something is made in argument also of the difficulty which the advocates of the infallibility of the church have found in agreeing as to where it is lodged. But to this the Roman Catholic retorts that equal or greater difficulties attach to the Protestant statements concerning the infallibility of the Bible (q.v.).

INFALLIBLE, a. *ĭn-făl'lĭ-bl* [*in*, not, and *fallible:* It. *infallible:* F. *infaillible*]: that cannot err or be deceived; certain; INFAL'LIBLY, ad. *-blĭ*. INFAL'LIBIL'ITY, n. *-bĭl'ĭ-tĭ* [F. *infallibilité*], or INFAL'LIBLENESS, n. *-bl-nĕs*, entire exemption from liability to error. INFALLIBILITY OF THE BIBLE (see INSPIRATION OF THE BIBLE).

INFAMED', or DEFAMED', in Heraldry: epithet applied to a lion or other animal which has lost its tail, the loss being supposed to disgrace or defame it. *Defamed looking backward* occurs in ancient blazon for counter-rampant regardant, the lion being supposed to be fleeing from an enemy.

INFAMOUS, a. *in'fă-mŭs* [L. *infāmĭs*, ill spoken of—from *in*, not; *fāmă*, fame: It. *infame;* F. *infâme*, in-

famous]: having a reputation notoriously vile; base; odious; detestable. IN'FAMOUSLY, ad. *-lĭ.* INFAMY, n. *ĭn'fă-mĭ* [F. *infamie*—from L. *infāmĭa*]: public disgrace; extreme baseness or vileness; qualities which are detested and despised. IN'FAMOUS WITNESS, witness to whose name infamy attached; formerly rejected in the courts of Great Britain, but now allowed to give evidence subject to comment, and to state what he can say for what it is worth. IN'FAMOUS BEHAVIOR—DISCHARGE WITH INFAMY, terms in use in the military and naval codes to designate conduct (and its penalty) not only opposed to discipline, but also disgraceful in a social sense. In all countries, the following have always been classed as infamous behavior; desertion of colors on the field of battle, failure to attempt to succor comrades in danger, cold blooded cruelty, and other crimes greatly subversive of morality. If a man be found guilty of any of these crimes by a court-martial, and not sentenced to death, the sentence is ordinarily discharge—or dismissal—with ignominy or infamy.—SYN. of 'infamous': odious; disgraceful; ignominious; detestable; scandalous; shameful; base; vile.

INFANCY, n. *ĭn'făn-sĭ* [F. *infant*—from Sp. *infante,* an infant; F. *enfant,* a child—from L. *infans* or *infan'tem,* very young, little: F. *enfance,* infancy—from L. *infantĭă,* childhood]: the first part of life; the first age of anything; early period; in *law,* state of being a minor. INFANT, n. *ĭn'fănt,* a babe; a child; in *law,* a person under 21 years: ADJ. tender; young; immature. INFANTE, n. *ĭn-făn'tā,* in *Spain* and *Portugal,* any son of the king except the eldest; any daughter except the eldest is styled the INFAN'TA, n. *-tă.* Since the 14th c., the heir-apparent to the throne in Spain has been styled Prince of Asturias; and the heir-apparent in Portugal, until the separation of Brazil from the mother country, bore the title of Prince of Brazil. The personal domain of an Infante or Infanta is called the *Infantado,* and this has come to be the name of a district which was made a dukedom 1475. INFANTILE, a. *ĭn'făn-tīl* [OF.—L.]: of or relating to an infant; young; childish. IN'FANTINE, a. *-tīn* [OF. *infantin*]: pertaining to young children.

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